Coping under acute stress

Delahaij, R.

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Coping under acute stress:

The role of person characteristics

Roos Delahaij

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Note from the artist: Apart from the aunt-niece relationship between Roos Delahaij (1978) and Mienk Verhoeven (pre-war 1938), there has been a process of sharing of ideas. On many occasions Roos sat for her aunt as a model in black and white photo-portraits. Over the years they talked about creativity as comfort, about art and subjects of human interest. An important issue became the professional development of Roos. The cover of this book shows a result of these interactions.

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Coping under acute stress:

The role of person characteristics

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Promotores:

prof. dr. A.W.K. Gaillard

prof. dr. J.M.M.L. Soeters

Copromotor:

dr. K. van Dam

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Chapter 1

Introduction

In the night of 14 to 15 August 2004, a unit of the Dutch Military Police (MP) of SFIR-4 (Stabilisation Force Iraq) was taken by surprise when they were shot at in the centre of Ar Rumaytah. They managed to drive away, but were stranded on the outskirts of the city with one serviceman deadly injured. They contacted the local base. Emergency procedures were set in motion: subsequently several Quick Reaction Force (QRF) units were sent out to help, a medevac (medical evacuation by helicopter) was requested from the air base in Tallil, and the battalion commander in As Samawah was informed. A first QRF arrived at the scene, receiving minor fire on their way in. A second QRF was not that lucky. In the center of Ar Rumaythah they were shot at with heavy calibre weapons, such as RPG's (Rocket Propelled Grenades). They drove off, but the shooting continued for two kilometres. What had first seemed to be a hit-and-run action, developed into a full-blown ambush. The QRF returned fire fiercely, and tried to get away. However, the last vehicle was damaged by an RPG and broke down. A group of four was left to their own devices. They managed to leave the vehicle while under fire and found cover in a backyard. They had no way to contact their colleagues. What followed was a very stressful hour for both the stranded men and their colleagues who tried to find them. Due to a combination of professionalism and luck, the four men were found, some heavily injured, and returned to the base. Four hours after the first shots were fired all units were back at the base. Luckily, most made it back alive. Several were wounded. One serviceman of the Military Police unit did not survive.[1]

This incident not only provides an illustration of the topic of this dissertation, namely coping under acute stress, but also formed a direct 'raison d'être' for this project. In the aftermath of this incident, the commander of the Air Mobile Brigade Training Battalion (the stranded soldiers were from the Air Mobile Brigade) wondered how servicemen and women can be better prepared for situations that are acute and highly stressful, such as the ambush. Although he acknowledged the

[1] The case description of this situation is based on a series of interviews with servicemen involved and supplementary material (see Delahaij, Kamphuis, van Bezooijen, Vogelaar, Kramer, & van Fenema, 2009).

professionalism with which the soldiers had handled the situation, he was also interested in ways to improve training in order to prepare servicemen optimally for these kinds of situations. Hence, this project was born: in a collaboration between the Netherlands Defence Academy, TNO Defence, Security, and Safety, and Tilburg University, I had the opportunity to work on this project for four years, with this dissertation as (one of) the outcome(s). In this dissertation, I investigated the processes underlying performance in acute stress situations. I mainly investigated the importance of person characteristics, but also considered the way organization culture can influence an individual's capability to cope and perform under acute stress. In the rest of this chapter I will introduce the topic using the incident described above as an example. In addition, I will shortly discuss the set-up of the study, and present an outline of the dissertation.

Coping under acute stress during an ambush[2]

People experience stress when the demands of the environment exceed the (perceived) resources of the individual (Lazarus & Folkman, 1984). Stress can be enduring or acute. Causes of enduring stress can be for example a longer period of too high workload, or a chronic illness of a relative. This dissertation is about coping in acute stress situations. Acute stress situations are 'sudden, novel, intense, and of relatively short duration, disrupt goal-oriented behavior, and require a proximal response' (Salas, Driskel & Hughes, 1996, p. 6). The ambush described above is a good example of an acute stress situation. Some quotes of servicemen in the second QRF provide a good illustration:

'When the shooting started, I did not know....it seemed like fireworks. Explosions occurred, big explosions, from the RPG's of course. ...I saw tracers, and explosions on the left, then I knew that we were under fire. Then everything happened so quickly.'...'So, I called: contact (i.e., shots fired) right' and the MAG (i.e., soldier operating automatic weapon on the vehicle) turned and started shooting, and I started shooting at what I saw..., it all happened so quickly, because the whole lot is speeding up, they are driving as fast as possible and I just tried to concentrate on the source of the incoming fire and tried to return fire.'

'When we drove into the centre, just as we crossed the bridge and turned right, they started shooting RPG's at us [...]. Immediately, I thought: "well, this is it" [...]. We just did not see it coming. Although you expect such a thing to happen, you think "where did this come from?" [...] Then it is for real. We returned fire fiercely,

[2] This paragraph is based on Kramer, van Bezooijen, & Delahaij (in press), and Kamphuis & Delahaij (2009).

RPG's flying over our heads, in front of us, coming from underneath other vehicles [...]. We immediately knew we were in an ambush. And we drove off, but we were attacked from all sides. And we returned fire. We only came as far as one street... we were hit by an RPG or something, I don't know exactly, and we crashed at the centre shoulder of the road...and we just came to a halt..[..]..and I saw somebody on the roof firing another RPG at us. It hit the hood of the car.'

The ambush was certainly *sudden*, *novel* and *intense*, in that the servicemen involved did not see it coming, had not experienced it before, and were confronted with a life-threatening situation. The incident was also of *relatively short duration*: the whole episode lasted about four hours. In addition, it clearly *disrupted goal-directed behavior*: the second QRF was supposed to help the stranded Military Police unit, but instead needed help itself to get out of an even more dangerous situation. Finally, the situation required a *proximal response*: if the servicemen involved had not reacted so quickly and adequately, by driving off, returning fire and finding cover, things could have easily ended up worse. In sum, this is clearly an acute stress situation, which brings us to the core of this dissertation.

The central question of this dissertation is: 'Who can perform in an acute stress situation, and why?' To answer this question, we need to have some insight in the processes that determine people's response in this kind of situation. Let's go back to the definition of stress: People experience stress when the demands of the environment exceed the (perceived) resources of the individual (Lazarus & Folkman, 1984). According to Lazarus and Folkman, whether people experience stress depends on the nature of the situation, and on the way the person perceives the situation and his or her capabilities to handle the situation. Situations can only be stressful to an individual when the situation poses a potential threat of loss of resources (e.g., life, money, status). In other words, something has to be at stake and this has to be of some importance to the individual involved.

Lazarus and Folkman (1984) introduced the concept of cognitive appraisal to explain why people react differently to stressful situations: because they interpret or 'appraise' the situation differently. Lazarus and Folkman (1984) make a distinction between 'primary' and 'secondary' appraisal. The first refers to the appraisal of the severity of the situation, the second to the appraisal whether anything can be done about the situation. People will experience more stress when they perceive the threat as more severe and difficult to control. Acute stress can lead to emotional (e.g., fear, anger), physiological (e.g., increased blood pressure, palpitations and trembling), and cognitive reactions (e.g., negative thoughts about oneself), resulting in impaired attention and energetic state (Gaillard, 2008). These decrements tend to disable a person to concentrate fully on the current task,

which results in a lack of cognitive control over task performance (Gaillard, 2008). In other words, when people get stressed, their emotional, physiological and cognitive reactions can be so distracting that they are not able to fully concentrate on the task. One of the stranded servicemen of the second QRF describes his stress reactions and the effects they had on his capabilities to act and those of his colleagues:

'Normally ..., you don't forget anything, it all flows, so to say. But at such a moment, you just shut down. Adding one and one together is almost impossible, because you are not able to think.'

' .. when I tried to explain what to do, he did not get it. I had to grab him and say: "Lay down and observe the surroundings". He had lost it.'

This quote illustrates that during an incident, the threatening nature of the situation can cause so much stress that it is difficult for servicemen to act on the situation. One way the military organization prepares her personnel for this kind of situation is by training drills and skills (e.g., King, 2006). Drills are standard reflexive reactions, which ensure that servicemen react automatically to certain situations, such as finding cover when being shot at. Skills refer to the basic military skills, like firing a weapon. Extensive training of drills and skills to the point they can be executed automatically, is an effective way of overcoming possible performance decrements due to stress, because automatic reactions can be executed without much cognitive control, such as when concentration is low (Driskell, Willis, & Copper, 1992). In other words, in situations where there is a decreased ability to think, like in an acute stress situation, this will not hamper the execution of drills and skills much when they are trained to an extent that servicemen can execute them automatically. The servicemen involved in the ambush also underlined the importance of drill training:

'Then (i.e., during the ambush) you just fall back on your drills, you notice that you are only executing your drills. And the rest (i.e., of training), you don't think about that'.

'It was acting on drills. What you have learned. Just fall back on drills. And that means accelerating (i.e., driver of a vehicle) for one, keeping communications open for the other, and firing for a third …'

Thus, training all possible drills and skills to the extent that they are fully automated, appears to be the panacea for effective coping under acute stress. However, it is not possible to train for every possible situation. This is especially the case for military operations nowadays, which can be highly

complex and ambiguous due to irregular opponents, Rules of Engagement, and international partners. In addition, not every situation can be trained for with drills and skills training. Making the right decision at crucial moments often requires a thinking soldier. This can be illustrated by the way the four stranded soldiers eventually found help:

'At one point they said "I hear Patria's (i.e., friendly armoured vehicles)." So I said "I will have a look." … But I thought I saw a car with enemy soldiers, with AK's… So, I go back to the boys and say "Be quiet, they are enemy". They looked at me "That sounds like a Patria.' Then I thought "I saw these four lights on a straight line … a Patria has that as well". .. So, I went and looked again. And indeed, it was a Patria. I was hallucinating back then.'

This situation was an important turning point during the ambush that positively affected the turn of events for the stranded group, but also shows how decision making can be impaired by stress. What makes the difference in such situations is how people cope with the stressful situation. Lazarus and Folkman (1984, p. 141) define coping as 'constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person'. In other words, coping refers to the way people regulate their behavioral and cognitive reactions during a stressful situation. Effective coping during acute stress situations encompasses all behavioral and cognitive reactions that enable an individual to effectively control the source of threat. Some quotes that illustrate effective coping during the ambush:

'At one moment (i.e., in one of the vehicles during the ambush) when things calmed down, I changed my loading clip and that all happened automatically.'

'We received fire from all sides and then I said: "move away from the vehicle" [...]. I thought: when we stay here too long, we are just attracting incoming fire, and everybody will come here.'

'When we ran across the street (i.e., stranded group, after leaving the vehicle) [...], he ran past that wall and knew that he had to keep a meter distance to the wall, otherwise it can hit the wall and then you.'

'[...] it was very difficult to think, it took a lot of effort. Therefore, with everything we did we said "ok, take it easy and think: what are we going to do?"'

These quotes illustrate effective coping, because all the reactions described were aimed at 'transforming' a threatening situation into a safer one. Sometimes by relying on drills, sometimes by taking decisions, and sometimes by taking a minute and making a plan despite stress reactions

that hamper your ability to think. The focus of this dissertation is on person characteristics that are expected to predict effective coping under acute stress.

Set-up of the study

In order to measure coping under acute stress, several basic military training institutions of the Dutch Defense Force were requested to participate in the research. The study is based on three samples coming from different basic military training programs. First, the basic military training part of the officer cadet education of the Netherlands Defence Academy (18 weeks) participated. Second, the basic military training of the Dutch Army Air Mobile Brigade (22 weeks) participated. Third, the basic military training of the Dutch Marine Corps (33 weeks) participated. We studied two cohorts of each of these programs. The first cohort of the Netherlands Defence Academy was a pilot study in which 94 cadets participated. In the second cohort of the Netherlands Defence Academy 264 cadets participated. In total 236 recruits of the Air Mobile Brigade participated, and 170 recruits of the Marine Corps participated in this study. Participation was voluntary. Samples sizes can differ per chapter, because of attrition[3] and not all the participants were present at all measurements. In addition, the data from the Marine Corps were not included in all chapters, because sample size was sometimes too low to include them in the analysis, and because we were not able to collect performance measures in this sample. The purpose of basic military training is to familiarize cadets and recruits with military life, teach basic military skills and drills, and enhance stress resilience. For the latter purpose stressful exercises are used, such as working at great heights, in caves or under water.

For the present dissertation, four measurements were conducted during these basic military training programs. Survey sessions in classrooms were conducted at the beginning, middle, and at the end of basic military training, in which person characteristics and perceived organization culture were measured. Stressful military exercises were used[4] to examine appraisal, coping behavior and performance under acute stress. For the

[3] Attrition is about 15-20 % for basic military training at the Netherlands Defence Academy and about 50 % for basic military training of the Air Mobile Brigade and the Marine Corps.

[4] These exercises were conducted as usual, except that we requested the cadets and recruits, and sometimes the military instructors to fill out a questionnaire afterwards.

officer cadets and the Air Mobile Brigade recruits a military self-defense exercise was used, and for the Marine Corp recruits a 'heliditch' exercise was used, in which recruits had to escape from a submerged helicopter. During the first week of training, participants were informed about the goals of the study. They were also told that participation was voluntary, and that consent was implied by completion and return of the survey. Participants were given a research number. Only the researchers had access to the name connected to the number.

Overview of the dissertation

Chapter 2 introduces the conceptual model that guided the research reported in this dissertation. The conceptual model is based on theories from different research fields: human factors, personality psychology, industrial and organizational psychology, and military psychology. Central to the model are three person characteristics (i.e., coping style, coping self-efficacy, and metacognitive awareness about stress and coping) that are expected to influence coping and performance during acute stress, and in turn are expected to be affected by personality and organizational characteristics.

Chapters 3 to 6 provide empirical tests of the different hypothesis deducted from the conceptual model presented in Chapter 2. Chapter 3 focuses on the importance of coping behavior for effective performance under acute stress. In addition, it was investigated whether coping behavior mediates the relationship between coping style, coping self-efficacy and metacognitive awareness on the one hand, and performance on the other. Performance was measured using military instructors' rating of performance of the participants during a stressful military exercise. Chapter 4 examines the mediating role of appraisal between coping self-efficacy and coping behavior. In addition, the development of coping style and coping self-efficacy during basic military training was investigated.

In Chapter 5 and 6 the focus is on the way personality and perceived organization culture affect the contextual level and situational level variables in the model. In Chapter 5, the results on the effect of the personality characteristic hardiness on coping style and coping self-efficacy, and appraisal and coping behavior are discussed. For this study, the longitudinal data are used to their full extent measuring hardiness, coping style and coping self-efficacy, and appraisal and coping behaviors at different moments. In Chapter 6, it was investigated whether metacognitive awareness about stress and coping influences the development of effective

coping style during basic military training. In addition, the effect of goal orientation and perceived error culture were assessed.

Finally, in Chapter 7 the findings of these studies are discussed in light of the conceptual model described in Chapter 2. Theoretical and practical implications, and strengths and limitations are discussed.

Chapter 2

The influence of person and organization characteristics on coping and performance under acute stress: A conceptual model[5]

Abstract

On the basis of an extensive literature review, a conceptual model is proposed, which aims to explain the way person and organization characteristics affect the coping process and performance under acute stress. Central to the model are the following three person characteristics: coping style, coping self-efficacy, and metacognitive awareness. The model poses expectations of how these characteristics influence the coping process (Lazarus & Folkman, 1984), and through that performance under acute stress. In addition, the model poses expectations of how personality and organization characteristics affect coping style, coping self-efficacy and metacognitive awareness.

Introduction

In some jobs it is very likely for stressful events to occur. For example because you are being shot at, the left engine of the plane you are flying suddenly breaks down, your patient starts bleeding out, or the fire which was supposed to be under control flames up just as you are trying to get victims to safety. At that moment, it is part of your job to do what you have to, for example make sure your platoon gets to safety, land the plane, or save the patient or the burn-victim. I am interested in the way people cope with the short-term outcomes of acute stress situations that can impair immediate performance on a task. Acute stress situations are 'sudden, novel, intense, and of relatively short duration, disrupt goal-oriented behavior, and require a proximal response' (Salas, Driskel, & Hughes, 1996, p.6). In the present chapter, a conceptual model is proposed, which aims to explain how

[5] This chapter is based on Delahaij, Gaillard, & Soeters (2008)

person and organization characteristics influence coping in an acute stress situation.

Research into performance under acute stress has been conducted in the domain of human factors for some decades. Incidents like the shooting of an Iranian civilian airliner by the U.S. Vincennes and airplane accidents (e.g., Klein, 1996) have boosted this field of research. The main question has been 'How is performance of operators influenced by acute stress', where operators can be pilots, employees in a nuclear power plant, soldiers, or any other professionals for which cognitive functioning may be influenced by acute stress. In human factors research, most studies have addressed the effects of a specific stressor, like noise, group pressure, threat, work load or time pressure, on simple performance tasks which measure performance accuracy and speed, but also on more complex decision making tasks. In general, these studies have shown that acute stressors can evoke strong negative emotions and physiological reactions, and impair performance. For an overview, see Staal (2004) and Salas et al. (1996). However, most studies reported in this field are based on laboratory experiments. These studies may lack external validity, because it is very difficult to simulate the severity of acute stressors in the laboratory.

Studies that have tried to simulate realistic acute stress, have been conducted during training of professionals in the military (Eid & Morgan, 2006; Lieberman, Niro, Tharion, Nindl, Castellani & Montain, 2006; Harris, Hancock & Harris, 2005; Lieberman, Bathalon, Falco, Morgan, Niro & Tharion, 2005; Eid, Johnson, Saus & Risberg**,** 2004; Larsen, 2001; Keinan, 1987; Berkun, Bialek, Kern & Yagi, 1962), police (LeBlanc, Regehr, Blake, & Barath, 2008; Meyerhoff, Saviolakis, Burge, Norris, Wollert, Atkins & Spielberger, 2005; Stafford, Oron-Gilad, Szalma, & Hancock, 2004) and fire-fighting domain (Gohm, Bauman, & Sniezek, 2001). For example, Larsen (2001) showed that sleep-deprived military students showed impaired decision making skills during a live-fire exercise when put in an acute stress situation. Meyerhoff et al. (2005) showed that during highly stressful realistic police training, trainees failed to use proper drills and showed impaired decision making. In addition, research into the effects of acute stress on performance has also been done by studying divers (Baddeley, 2000) and parachutists (Fenz & Epstein, 1967). Studies in the field of human factors and ergonomics have mainly focused on measures in the design of work environments to protect performance. However, the focus of the conceptual model presented in this chapter is on person and organization characteristics that affect performance under acute stress. The conceptual model presented here is the result of a review of research on this

topic. Theories and research from the fields human factors, personality psychology, industrial and organizational psychology and military psychology were included. The model is based on theories about stress and behavior/performance by Gaillard (2001, 2008), and Lazarus and Folkman (1984). Before presenting the model these theories will be discussed.

Acute stress and performance

Acute stress can lead to emotional (e.g., fear, anger), physiological (e.g., increased blood pressure, palpitations and heart rate), and cognitive reactions (e.g., negative thoughts about oneself), resulting in impaired attention and energetic state (Gaillard, 2001, 2008). These decrements tend to disable a person to concentrate fully on the current task, which results in a lack of cognitive control over task performance (Gaillard, 2001, 2008). This can lead to impaired decision making because people do not take into account the relevant aspects of the situation (Staw, Sandelands, & Dutton, 1981), and impaired task performance because people fail to remain focused on the goals of the task (Gaillard, 2008). However, it also depends on the nature of the task to which extent performance will suffer from a loss of concentration. Simpler and automated tasks will suffer less compared to more complex tasks, that demand more controlled cognitive processing (Gaillard, 2008).

Performance can be protected by not letting oneself be distracted by intrusive emotions, physiological reactions or thoughts, but by regulating one's emotional and energetic state so it does not interfere with task performance and actively directing focus to the task (Gaillard, 2008; Tenenbaum, Edmonds, & Eccles, 2008; Sarason, 1984). In this view, performance under acute stress depends on the interference of negative emotions and physiological reactions with task execution and the way people cope with the situation. Lazarus and Folkman (1984) provide a conceptual framework that explains why people cope differently, which will be discussed next.

Transactional theory of stress and coping

In 1984, Lazarus and Folkman introduced the concept of cognitive appraisal to explain why people react differently to stressful situations. According to their transactional model, people differ in the way they react to a stressful situation because they interpret or 'appraise' the situation differently. Lazarus and Folkman (1984) make a distinction between 'primary' and 'secondary' appraisal. The first refers to the appraisal of the severity of the situation, the second to the appraisal of whether anything can be done about

the situation. More specifically, secondary appraisal is 'a complex evaluative process that takes into account which coping options are available, the likelihood that a given coping option will accomplish what it is supposed to, and the likelihood that one can apply a particular strategy or set of strategies effectively' (Lazarus & Folkman, 1984, p. 35). Although the appraisals are called 'primary' and 'secondary', Lazarus and Folkman (1984) underline that the first does not necessarily precede the second. During a stressful situation, there is a constant interaction between primary and secondary appraisal which determines the severity and nature of stress reactions experienced.

Appraisal affects coping behavior. More specifically, secondary appraisal influences the chosen coping behavior, because it determines the perceived feasibility of the different coping options available. Lazarus and Folkman (1984, p. 141) define coping as 'constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person'. In coping research, a distinction is made between two kinds of coping strategies: emotion-focused and task-focused coping (Aldwin, 2007; Litman, 2006; Folkman & Moskowitz, 2004; Stanton, Kirk, Cameron, & Danoff-Burg, 2000; Carver & Scheier, 1994; Endler & Parker, 1990, 1994; Folkman & Lazarus, 1985; Lazarus & Folkman, 1984). Emotion-focused coping refers to coping efforts aimed at managing the emotional distress itself. Emotion-focused coping entails focusing attention on controlling emotional and physiological reactions, for example by venting emotions. Task-focused coping refers to coping efforts aimed at managing the problem or situation that is causing the distress, for example by analyzing the situation or taking action. Some scholars have added other categories of coping, such as avoidance-oriented or meaning-focused coping. Avoidance-oriented coping refers to coping aimed at distancing oneself from the situation, for example by physically leaving a stressful situation (e.g., Endler & Parker, 1990, 1994). Meaning-focused coping is aimed at reframing the situation (e.g., Mikulincer & Florian, 1996), for example by interpreting job loss as an opportunity to make a career change.

Folkman and Lazarus (1985) have observed that different forms of coping are used during a single stressful episode. In their view, coping is a process that is situation-dependent and continuous as the situation unfolds. This process is a result of the continuous reappraisal of the situation, which subsequently evokes the use of different coping strategies. Recently, research into coping flexibility has shown that the ability to effectively modify coping behavior to the demands of the situation is highly adaptive

(Sideridis, 2006; Folkman & Moskowitz, 2004; Cheng, 2001; Mattlin, Wethington, & Kessler, 1990; Zeidner & Saklofske, 1996). This is in line with studies, that have shown that task-focused and emotion-focused coping behavior are effective in different kinds of situations: task-focused coping behavior is more effective in controllable situations (i.e., when something can be done, do it) and emotion-focused coping behavior is more effective in uncontrollable situations (i.e., try to relax, when nothing can be done) (e.g., Cohen, Ben-Zur, & Rosenfeld, 2008; Folkman & Moskowitz, 2004; Park, Folkman, & Bostrom, 2001; Endler, Speer, Johnson, & Flett, 2000; Ben-Zur, 1999; Terry & Hynes, 1998; Bagget, Saab, & Carver, 1996; Strentz & Auerbach, 1988; Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986; Lazarus & Folkman, 1984). However, Lazarus and Folkman (1984) have underlined that in some controllable situations, emotion-focused coping behavior may be effective because it facilitates task-focused coping behavior by lowering distress that interferes with task-focused coping behavior.

Outline of the model

The conceptual model outlined here is depicted in Figure 1. The variables in the model are distinguished on the basis of proximity to the outcome. Several scholars have advocated the use of this approach to improve the predictive value of person characteristics on behavior and performance during a specific event (e.g., Ployhart & Bliese, 2006; Lee, Sheldon, & Turban, 2003; Vallerand, 2000; Chen, Gully, Whiteman, & Kilcullen, 2000). Vallerand (2000) distinguishes variables on three levels of proximity: global, contextual and situational. The global level consists of broad dispositions, such as hardiness and achievement motivation. These dispositions shape the contextual person characteristics at the second level, which are more domain-specific (e.g., self-efficacy), and relatively stable. These contextual person characteristics affect the third level, which is situational and consists of responses to a specific situation. These responses can change from situation to situation. In the conceptual model presented here, a distinction is made between global and contextual person characteristics that influence the coping process. The coping process represents the situational level.

The contextual person characteristics influence performance under acute stress through their direct effects on the coping process, and mediate between personality and organization characteristics, and the coping process. The model encompasses three contextual person characteristics that

play an important role in the coping process: coping style, coping self-efficacy and metacognitive awareness about stress and coping (MASC). These three person characteristics are important predictors of the coping process and are considered to influence coping behavior in different ways (which will be discussed in more detail in the next sections). In addition, these person characteristics are assumed to be trainable, because they play an important role in Stress Inoculation Training or Stress Exposure Training Programs (Driskel, Salas, Johnston & Wollert 2007; Saunders, Driskell, Johnston, & Salas, 1996; Meichenbaum, 1985). The key elements of these programs are, 1) to learn more adaptive ways of coping (i.e., coping style), 2) to gain self-confidence in the ability to cope with stress (i.e., coping self-efficacy), and 3) to learn to reflect upon and regulate coping behavior (i.e., metacognitive awareness) (Johnston & Cannon-Bowers, 1996). Studies have shown that stress management programs, such as SET, are effective in reducing anxiety and can increase self-efficacy (Saunders et al., 1996) and change people's way of coping (e.g., Cunningham, Brandon, & Frydenberg, 2002; Foley, Bedell, LaRocca, & Scheinberg, 1987).

The global personality characteristics may influence the coping process either directly or via the contextual person characteristics. I am mainly interested in the latter (therefore only this pathway is represented in the model), for the following reasons. First, studying the way contextual person characteristics mediate between the global personality characteristics and the coping process provides insight in the mechanisms that explain how personality affects the coping process. Second, results could give implications for the 'trainability' of people with certain personality characteristics, which can be used to improve selection and training (Keinan & Friedland, 1996).

Besides personality characteristics, organization characteristics are included as predictors of the contextual person characteristics. It was hypothesized that organization characteristics, such as organization culture (Soeters, 2000), can influence performance under acute stress because they influence the contextual person characteristics.

According to Vallerand (2000), global level variables affect contextual level variables, which in turn affect situational level variables. This 'top-down' effect is represented in the model by the influence of personality characteristics on the coping process through the contextual person characteristics. In addition, Vallerand (2000) proposes a 'bottom-up' effect, that is, the situational level variables have a recursive effect on the contextual level variables, and in turn the contextual level variables have a recursive effect on the global level variables. However, in the present

dissertation these effects were not studied. In the following sections the different variables included in the model and their interrelations will be discussed in more detail. The variables will be discussed using the distinction between global, contextual and situational levels (cf. Vallerand, 2000), starting with the latter. In the final section the influence of organization characteristics will be discussed.

Situational level

Performance. The main outcome is *performance* in an acute stress situation, which refers to the quality of performance, defined as the level of effectiveness of performance for a specific task. In this model, these tasks are aimed at controlling the source of acute stress (e.g., returning fire, calling for back up) or possible negative consequences of the stressful situation (e.g., helping wounded).[6]

Coping process. In the model the *coping process* mediates between the contextual person characteristics on the one hand and performance on the other. In acute stress situations, primary appraisal refers to the assessment of the severity of the (potential) damage to the person. When harm is anticipated, anticipatory coping is possible, that is, it is still possible to prevent the harm (in contrast to harm that has already been done). I am mainly interested in adaptive coping and effective performance in these situations. Two kinds of appraisal can be made in anticipated harm situations: threat or challenge. A threat appraisal focuses on the possible harm, whereas a challenge appraisal focuses on possible gain or growth. Lazarus and Folkman (1984) underlined that threat and challenge appraisals are not two ends of one dimension, but can be experienced at the same time. However, the more dominant appraisal will determine the way in which a situation is experienced and the reaction to the situation. Threat and challenge appraisal have different effects on emotions, energetic state, cognition and coping behavior. Whereas a threat appraisal evokes negative emotions like fear, anxiety and anger, a challenge appraisal evokes more positive emotions like eagerness and excitement. Whereas threat appraisal evokes inadaptive physiological reactions (i.e., overreactivity: trembling, hyperventilating, palpitations) and can impair performance, challenge

[6] Originally, state anxiety was also considered to be an outcome in this model and state anxiety was measured during the exercises. However, state anxiety correlated highly with both threat appraisal and emotion-focused coping behavior. One reason for this is that some items measuring threat appraisal (through threat emotions, see Chapter 4) were similar to state anxiety items. To avoid potential confounding in the results, state anxiety was not included in the analyses reported in this dissertation.

appraisal evokes more adaptive physiological reactions (i.e., efficient mobilization of physiological resources) that enables the body to react quickly to potential threats (Gaillard, 2008; Blascovich, Seery, Mugridge, Norris, & Weisbuch, 2004; Skinner & Brewer, 2002; Tomaka, Blascovich, Kibbler, & Ernst, 1997, Blascovich & Tomaka, 1996). Finally, threat and challenge appraisals appear to affect coping behavior differently (Lazarus & Folkman, 1984). In general, people are more likely to use emotion-focused coping behavior when they appraise that little or nothing can be done about the situation (i.e., threat appraisal), whereas task-focused coping behavior will be used when the situation is appraised as amenable to change (i.e., challenge appraisal) (e.g., Bagget, et al., 1996; Folkman & Lazarus, 1985). As a result, people who appraise a stressful situation as challenging will perform better than people who appraise it as threatening (e.g., Gildea, Schneider, & Shebilske, 2007).

To summarize, the coping process influences performance under acute stress in two ways. First, the coping process determines the severity and nature of the stress reactions and thus one's emotional and energetic state. When a situation is appraised as threatening, people will have a less appropriate emotional and energetic state, which leads to deteriorated concentration and can therefore hamper performance. In contrast, when people appraise the situation as challenging, they will have a more adaptive emotional and energetic state and therefore be better able to perform well (Gaillard, 2008). Second, the coping process influences the coping behavior used. In an acute stress situation, task-focused coping behavior will be more effective than emotion-focused coping behavior, because it enables people to transform the threatening situation into a more benign one (Lazarus & Folkman, 1984). Although I acknowledge that some forms of emotion-focused coping behavior can facilitate task-focused coping behavior, I question whether this is the case in an acute stress situation. The nature of the situation (i.e., sudden, intense, requiring a proximal response) will leave little time for emotion-focused coping and can pose a risk because any lapses of attention may interfere with detecting upcoming danger in time and dealing with it effectively.

Finally, to what extent performance is deteriorated depends on the nature of the situation (e.g., controllable or not) and task (e.g., simple or complex). In addition, the quality of performance can feed back into the coping process. Performing well means that the source of the threat is controlled to some extent and therefore triggers a reappraisal of the situation (e.g., the situation is appraised as non-threatening) (e.g., Folkman &

Lazarus, 1988). This effect is represented by the feedback from performance to the coping process.

Contextual person characteristics

In the model, three contextual person characteristics influence the appraisal and coping process: *coping style*, *coping efficacy* and *metacognitive awareness about stress and coping* (MASC). It is expected that through these variables, the coping process and performance in an acute stress situation can be influenced by training and experience (see feedback paths from performance to metacognitive awareness and coping self-efficacy). The content and level of this change partly depends on personality and organization characteristics.

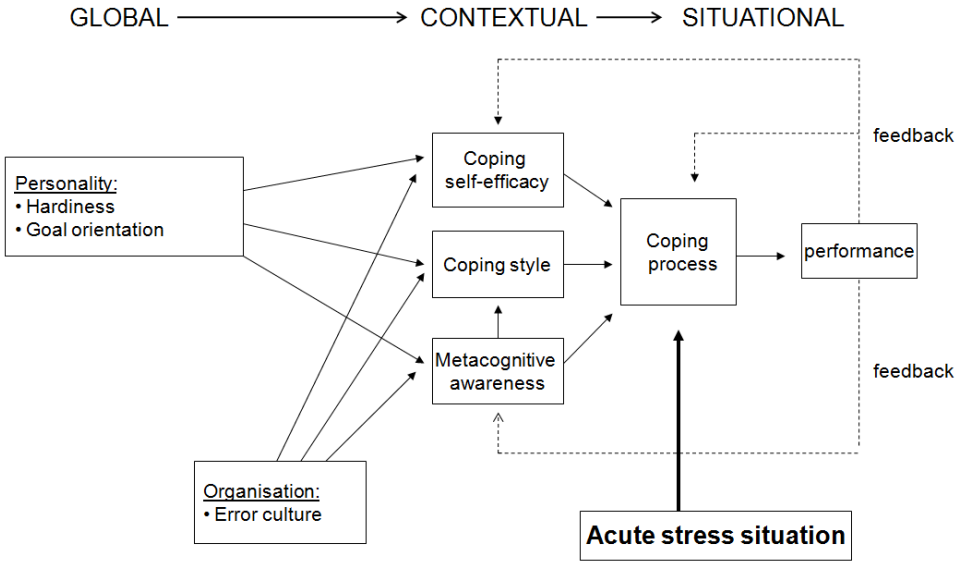

Figure 1. *Conceptual model*

Coping style. Coping style refers to people's habitual ways of coping. There has been some debate about whether a 'coping-trait' approach (i.e., an approach in which coping behavior is predicted by stable person characteristics) is suitable for studying the variability in coping behavior (Aldwin, 2007; Krohne 1996; Hewitt & Flett, 1996). Critics (Folkman & Lazarus, 1985; Cohen & Lazarus, 1973) have argued that personality traits are not appropriate for predicting coping behavior, because coping is a process and changes between and within situations and therefore is too

dynamic to study using traits as predictors. Also, they disputed the existence of general coping tendencies (i.e., coping style). In contrast, other researchers (Ptacek, Pierce, & Thompson, 2006; Ben-Zur, 1999; Krohne, 1996; Carver & Scheier, 1994) argue that it is relevant to study general coping tendencies because they partly predict coping behavior. These researchers state that although coping is a dynamic process and situation-dependent, this does not imply stable influences are non-existent.

In the present model, coping style is assumed to affect the coping process because it directly affects coping behavior. There is some evidence concerning the relationship between coping style and actual coping behavior (Matthews & Campbell, 1998; Endler & Parker, 1994; Carver & Scheier, 1994; Terry, 1994; Carver, Scheier, & Wientraub, 1989). Carver et al. (1989) asked students to report their coping behavior during the most stressful event of the last two months. They found moderate correlations between coping style and coping behavior. Ptacek et al. (2006) also asked students to report their coping behavior on the most stressful event they encountered during a regular week for 10 weeks. They found that coping style only weakly predicted coping behavior for one event, but was a strong predictor when coping behavior on the 10 events were aggregated. Matthews and Campbell (1998) found correlations between coping style and task related coping behavior during several tasks (e.g., information processing task, working memory task, mental arithmetic, university exam and driving simulator task). Finally, Carver and Scheier (1994) and Endler and Parker (1994) found that coping style was a moderate to strong predictor of coping behavior before an exam.

Coping self-efficacy. Bandura (1997, p. 3) has defined the concept of perceived self-efficacy as 'the beliefs in one's capability to organize and execute courses of action required to produce given attainments'. Over the past decades self-efficacy has been adopted as one of the most important motivational factors in goal directed behavior. Self-efficacy influences the goals people adopt, the way people try to obtain those goals, and the perseverance they show in trying to realize them. Self-efficacy is seen as an important predictor for future behavior and performance (Bandura, 1997). Self-efficacy is situation specific: in contrast to related concepts such as self-esteem, self-efficacy is not general, but specific to a situation or task. Thus, people may have strong positive self-efficacy beliefs in one domain, but not in the other. In our model, coping self-efficacy was included. Coping self-efficacy refers to beliefs people have about their capability to cope with specific stressful situations (Bandura, 1997). People who believe they can cope with a stressful situation, perceive the situation as controllable and

therefore appraise the situation as more challenging and less threatening (Diaz, Glass, Arnkoff, & Tanofsky-Kraff, 2001; Bandura, 1997; Gerin, Litt, Diech, & Pickering, 1996; Carver & Scheier, 1994; Smith, 1989; Bandura, Cioffi, Taylor, & Brouillard, 1988; Folkman and Lazarus, 1985). Studies have shown that people with a high sense of coping self-efficacy use more effective strategies to cope with stress, are better able to overcome barriers they encounter, and perform better in stressful situations (e.g., Gyurcsik, Bray, & Brittain, 2004; Benight & Harper, 2002; Haney & Long 1995; Chwalisz, Altmaier, & Russel, 1992; Ozer & Bandura, 1990; Keinan, 1983).

According to Bandura (1997), self-efficacy beliefs are mainly determined by previous experiences. Mastery experiences will lead to stronger efficacy beliefs. In line with this, it is hypothesized that the experience with an acute stress situation affects coping self-efficacy (represented by feedback path from performance), and therefore future behavior. More specifically, people who have had mastery experiences with performance under acute stress, for example during training, will perform better in future situations, because they have strong efficacy beliefs about their capabilities to perform under acute stress.

Metacognitive awareness about stress and coping. For 20 years now, metacognition has been seen as an important predictor of learning performance in the educational domain (Flavell, 1979). Schraw and Dennison (1994, p. 460) define metacognition as 'the ability to reflect upon, understand, and control one's learning'. Learners that are more 'metacognitively aware' are more strategic and perform better, because they can plan and monitor their learning to improve performance (Schraw & Dennison, 1994). Studies in academic performance and physical education have shown that people with strong metacognitive awareness choose more effective learning strategies and perform better (Theodosiou & Papaionnou, 2006; Schraw & Dennison, 1994; Meloth, 1990).

Metacognitive awareness about stress and coping is included in the model, because it is assumed to affect coping flexibility, which is the ability to effectively modify coping behavior in order to meet the demands of the current situation. An important prerequisite for coping flexibility is to have insight in one's own stress responses and coping behavior, and to be able to regulate these responses and behaviors. I defined the concept of metacognitive awareness about stress and coping as *a process, which encompasses insight in one's emotional and physiological reactions and coping behaviors during stressful situations, and the conscious regulation of these reactions and behaviors*.

Although to our knowledge metacognitive awareness has not been studied in the stress and coping domain, the importance of awareness about stress and coping to regulate coping behavior has been acknowledged since the development of cognitive-behavioral therapy for anxiety disorders (e.g., Johnston & Cannon-Bowers, 1996; Meichenbaum, 1985). Similarly to the educational domain, individuals with strong metacognitive awareness about stress and coping are assumed to use more effective coping strategies during an acute stress situation, because they are better able to regulate their coping behavior in order to meet the demands of the situation. In addition, people with strong metacognitive awareness will adopt a more effective coping style if this will improve their performance under stress, because they are able to learn from their experiences in acute stress situations (either during training or work). In the model, this influence is represented by the feedback path from performance to metacognitive awareness to coping style.

Global personality characteristics

Studies that have actually studied the role of global person characteristics on performance under acute stress are scarce. In addition, many of these studies have found weak relationship between global person characteristics and performance. For example, Gohm et al., (2001) studied the influence of emotional intelligence on self-reported cognitive difficulties during a live-fire exercise. She found that emotional clarity (knowing what you feel) was negatively related to cognitive difficulties. However, she only used self-report measures of cognitive deterioration. Meyerhoff et al., (2005) found a moderate negative relationship between trait anger and performance during a stressful police exercise. Stafford et al. (2004) looked at the influence of the Big-Five personality dimensions on shooting performance of policemen during a night-shooting exercise. They found marginally significant positive effects for *agreeableness* and *intellect* on shooting performance. Eid and Morgan (2006) examined the relation between hardiness and performance (evaluation by military instructor) during a prisoner of war exercise. They were not able to find a relationship between hardiness and performance. Thus, it seems that global person characteristics may have a lack of criterion value for specific behavior and performance during an acute stress situation (Paunonen, 1998). Using hierarchical models (i.e., in which both global and contextual person characteristics are included), such as the proposed model, could improve predictive value (Ployhart & Bliese, 2006).

Different kinds of personality characteristics have been shown to be related to coping style, coping self-efficacy or metacognitive awareness. Some relevant personality characteristics are neuroticism (e.g., Penley &

Tomaka, 2002; Hewitt & Flett, 1996; Terry, 1994), meta-emotional traits such as clarity, attention and intensity of emotion[7] (Gohm & Clore, 2002; Gohm, Corser, & Dalsky, 2005), locus of control (e.g., Aspinwall & Taylor, 1992; Philips & Gully, 1997), hardiness (Kobasa, 1979), optimism/pessimism (Hewitt & Flett, 1996; Scheier, Weintraub, & Carver, 1986) and achievement motivation (e.g., Bartels & Magun-Jackson, 2009; Theodosiou & Papaionnou, 2006; Dweck, 1986, Cumming & Hall, 2004).

In the present dissertation, I focused on two personality characteristics: hardiness and goal orientation, which are considered more domain-specific personality characteristics compared to the Big Five dimensions (Paunonen, 1998). In other words, they are less global (Vallerand, 2000), but have been shown to be relevant specifically for coping and learning in organizations. Hardiness has been shown to be a relevant predictor for performance (e.g., Bartone, Roland, Piccano, & Williams, 2008; Bartone, 1999a; Westman, 1990), and health in the military (e.g., Dolan & Adler, 2006; Britt, Adler, & Bartone, 2001; Bartone, 1999b; Florian, Mikulincer, & Taubman, 1995; Bartone, Ursano, Wright, & Ingraham, 1989), and therefore was expected to be a relevant predictor for coping style and coping self-efficacy in basic military training. Goal orientation has been shown to affect learning in organizations (Payne, Youngcourt, & Beaubien, 2007; Button, Mathieu, & Zajac, 1996), and therefore was expected to affect the development of recruits during basic military training. Next, these personality characteristics will be discussed in more detail.

Hardiness. Since Kobasa (1979) introduced the concept of hardiness as an important personality characteristic that affects the relationship between stress and health, many studies have shown the relevance of hardiness for health and performance (for reviews see Maddi, 2002; Funk, 1992). Hardiness is characterized by three interrelated attitudes: control, commitment and challenge. Hardy people believe they have control over the events they experience, are committed to what they do and perceive changing environments as challenging and a possibility for growth (Kobasa, 1979). Hardy people perform better and stay healthier in the face of stress, because they believe they can exert some control over the events they

[7] The meta-emotional traits, attention, intensity and clarity of emotion were also measured in the studies reported in the present dissertation, because it was expected that these personality characteristics would especially affect metacognitive awareness and coping style development. Attention and intensity did not show any of the expected effects. Clarity showed very similar effects to learning goal orientation, but is not reported in any of the chapters.

experience and more actively approach stressful situations in order to transform them into more benign situations (e.g., Beasley, Thompson, & Davidson, 2003; Maddi, 2002; Bartone, 1999; Westman, 1990). In other words, hardiness affects the way people tend to cope (i.e., coping style) as well as their beliefs about personal control over stressful situations (i.e., coping self-efficacy). In the conceptual model, hardiness is assumed to affect the contextual person characteristics coping self-efficacy and coping style, and through those the coping process. Several studies have found a positive relationship between hardiness and task-focused coping style, and a negative relationship between hardiness and coping styles that are more emotion-focused or avoidant (e.g., Soderstrom, Dolbier, Leiferman, & Steinhardt, 2000; Maddi & Hightower, 1999). To our knowledge, only Westman (1990) studied the relationship between hardiness and coping self-efficacy. She showed that hardy cadets were more confident in their ability to cope with a stressful military training.

Goal orientation. Achievement goals are considered important predictors of learning. A distinction is made between learning and performance goal orientation (Dweck, 1986). The first is characterized by a striving to enhance one's competence and to learn something new. The second is characterized by a striving to obtain positive and prevent negative judgments of others about one's competence. Dispositional goal orientation refers to one's goal preference in achievement situations and is assumed to be a stable person characteristic (Ames & Archer, 1988). In the educational psychology and organizational psychology literature, goal orientation has been shown to influence learning and performance because it determines how people interpret and respond to achievement situations (for review see Payne, et al., 2007). People with a strong learning goal orientation perceive adverse performance feedback as a possibility for growth and mastery. As a result, they use more deep-processing learning strategies that enable them to master the task, and are more persistent when confronted with adversity. People with a strong performance goal orientation perceive adverse performance feedback as an indication of their lack of ability, and consequently they use more surface approach learning strategies when trying to master the task, and are more avoidant and less persistent when confronted with adversity (Moneta & Spada, 2009; Deci & Ryan, 2000; Ames & Arcer, 1988).

In the conceptual model, goal orientation is assumed to affect coping style, coping self-efficacy and metacognitive awareness, because it affects to what extent people learn from their experiences with stressful situations. Studies that investigated the relationship between goal orientation and

coping in general have found that learning goal orientation is associated with task-focused coping and that performance goal orientation is associated with emotion-focused or avoidant coping (Moneta & Spada, 2009; Pensgaard & Roberts, 2003; Kaplan & Midgley, 1999; Ntoumanis, Biddle, & Haddock, 1999). In addition, several studies have shown a positive relationship between learning goal orientation and a negative relationship between performance goal orientation and self-efficacy, (e.g., Theodosiou & Papaionnou, 2006; Philips & Gully, 1997). Cumming and Hall (2004) showed this same pattern of results for coping self-efficacy. Learning goal orientation has also been positively related to metacognitive awareness (e.g., Bartels & Magun-Jackson, 2009; Theodosiou & Papaionnou, 2006). Ford, Smith, Weissbein, Gully and Salas (1998) found that learning goal orientation was positively and performance goal orientation was negatively related to metacognitive activity when mastering a complex decision making task.

Organization characteristics

As explained in Chapter 1, the main purpose of this dissertation is to gain insight in the way professionals perform in acute stress situations and how person characteristics influence this performance. Because professionals perform within the context of an organization, organization characteristics that affect the contextual person characteristics are also included in the model. For instance, an organization can affect employees' confidence in their ability to cope with stressful situations through its capability to provide coping resources (Van Fenema & Delahaij, 2009). Consider, for example, the effect of lack of air support for military teams in hostile areas, or the lack of proper vehicle protection against Improvised Explosive Devices on servicemen's coping self-efficacy. In addition, the quality of training and leadership determines perceptions of readiness and of available resources for combat situations, and consequently affects coping self-efficacy (Bartone, 2006; Shamir, Breinin, Zakay, & Popper, 1998; Bandura, 1997). In the present dissertation, I focused on organization culture.

In organizations like the military or police-force, the influence of organizational culture on employees' behavior and attitudes is great because these organizations have strong organizational norms and require total dedication to the organization (Soeters, Winslow, & Weibull, 2003; Soeters, 2000; Winslow, 2000). Entering this kind of organization is associated with a socialization process in which employees learn the values, abilities, expected behaviors, and social knowledge they need to perform in the organization (Louis, 1980). Organization norms affect the way people think

about and react to acute stress situation, because they determine employees' beliefs whether something can be done to prevent negative consequences (Cannon & Edmondson, 2005; Van Dyck, 2000). In addition, organization norms determine which kind of coping is accepted within an organization. For example, Dolan and Ender (2008) noted that among U.S. Army servicemen social drinking and seeking social support is a strategy that is widely used to cope with stress. Winslow (2000) observed a 'can do attitude' in the Canadian army, that is the belief that even when resources are insufficient for a task, the army 'can do it'. In other words, this aspect of army culture stimulates a task-focused coping orientation. Ben-Ari (1998) observed that controlling emotions is central to officers' identities' in the Israeli Defense Forces. Likewise, Le Scanff and Taugis (2002) identified an organizational norm within the police force that made employees refrain from showing or admitting fear or anxiety, because this was perceived as weak. Thus, some emotion-focused coping strategies, such as venting of emotions, seem to be less accepted in organizations like the military and police force. In the present dissertation, I focused on an aspect of organization culture, namely error culture. Perceived error culture was assumed to affect metacognitive awareness and coping style, because it affects learning from stressful situations. Next, error culture will be discussed in more detail.

Error culture. Error culture refers to 'organizational practices related to communicating about errors, to sharing error knowledge, to helping in error situations, and quickly detecting and handling errors' (Van Dyck, Frese, Baer, & Sonnentag, 2005). In an in-depth study Weick and Roberts (1993) examined the factors contributing to effective coping with potentially life-threatening situations on flight-decks. The findings illustrate the importance of an error culture that is focused on the constant anticipation of potential failures, caring and responsive interrelating, and willingness to learn from experience (i.e., heedful performance). They underline that errors can have detrimental consequences and consequently can cause acute stress in organizations such as the military. Therefore, it was hypothesized that organizational error culture will affect the way employees tend to cope, and their ability to learn from stressful situations.

Organizations can influence the way employees learn from stressful situations that hamper effective performance, because they influence the way employees learn from failure. Often employees do not learn from failure, because technological and social barriers within organizations inhibit employees from learning (Cannon & Edmondson, 2005). One aspect of the social environment that affects learning from failure is error culture

(Van Dyck et al., 2005). Like goal orientation, error culture affects learning, because it affects the way people perceive and deal with error situations (Van Dyck, 2000). A distinction can be made between error prevention culture, which aims to avoid negative error consequences, and error management culture, which aims to reduce negative error consequences and increase possible positive consequences. Thus, error management culture establishes a 'learning climate', whereas error aversion culture does not. As a result, the former is assumed to stimulate learning from error more than the latter (Van Dyck et al., 2005).

Because error situations are often stressful situations and people are more likely to make errors in stressful situations, error culture is expected to affect the way people learn from stressful situations. Error management culture is assumed to positively affect metacognitive awareness, because it stimulates employees to accept, learn and communicate (Van Dyck, 2000) about possible performance decrements due to stress. Hence, employees reflect more one their stress and coping responses, and try to regulate future coping behavior. In contrast, error aversion culture is assumed to negatively affect metacognitive awareness, because it does not stimulate learning from stressful situations. In addition, it was assumed that because error management culture stimulates a learning orientation towards performance in stressful situations, and consequently metacognitive awareness, it also stimulates the development of an effective coping style, because employees, who are more metacognitively aware, are better able to learn from their experiences. This is in line with the results of a study by Keith and Frese (2005), which showed that trainees receiving error management training, were better able to use learned skills and knowledge in a new situation (i.e., transfer of training) compared to trainees receiving error aversion training. Moreover, this effect was mediated by metacognitive activity (comparable to regulation in metacognitive awareness).

Conclusion

The conceptual model presented in this chapter provides hypotheses on how person and organization characteristics affect coping under acute stress. In the chapters 3 to 6 empirical tests of some of these hypotheses are provided.

Chapter 3 focuses on the importance of coping behavior for effective performance under acute stress. In addition, it was investigated whether coping behavior mediates the relationship between coping style, coping self-efficacy and metacognitive awareness on the one hand, and performance on the other. Chapter 4 examines the mediating role of

appraisal between coping self-efficacy and coping behavior. In addition, the development of coping style and coping self-efficacy during basic military training was investigated.

In Chapter 5 and 6 the focus is on the way personality and perceived organization culture affect the contextual level and situational level variables in the model. In Chapter 5, the results on the effect of the personality characteristic hardiness on coping style and coping self-efficacy, and appraisal and coping behavior are discussed. In Chapter 6, it was investigated whether metacognitive awareness about stress and coping influences the development of effective coping style during basic military training. In addition, the effect of goal orientation and perceived error culture on metacognitive awareness were assessed.

Chapter 3

Predicting performance under acute stress: The role of person characteristics[8]

Abstract

Performance under acute stress is an important issue for professionals in the military, police, and fire-fighting domain, and increasingly for other work environments. Understanding which person characteristics affect performance under acute stress is crucial for selection and training of these professionals. The present study examined how differences in coping style, coping self-efficacy, and metacognitive awareness influence performance under acute stress. Coping behavior was expected to mediate between the person characteristics and performance. Performance and coping behavior were measured during a realistic stressful exercise in two military samples (n =122 & n = 132). Results showed that coping self-efficacy and coping style affected coping behavior, and that coping behavior affected performance. Moreover, results showed that coping behavior mediated the relationships of coping style and coping self-efficacy with performance. Although metacognitive awareness was correlated with coping behavior, it did not have a unique contribution to the prediction of coping behavior. These results indicate that coping style and coping self-efficacy are important predictors of performance under acute stress.

Introduction

Nowadays, professionals in a range of jobs are likely to be confronted with acute stress during work. According to Salas, Driskel and Hughes (1996, p.6) an acute stress situation is 'sudden, novel, intense, and of relatively short duration, disrupts goal-oriented behavior, and requires a proximal response'. Traditionally, professionals in the military and police domain are known to be confronted with acute stress, because violent encounters are part of their job (e.g., being threatened with firearms, attacked by an angry mob). However, other types of professionals, like fire-fighters, pilots,

[8] This chapter is based on Delahaij, Gaillard, Soeters, & Van Dam (2009)

ambulance personnel, and surgeons are also confronted with acute stress situations, because they are responsible for the lives of others in crisis situations. Also, employees in jobs that are traditionally not associated with acute stress are increasingly confronted with threat in their work. Consider for example, civil servants who are attacked by discontent citizens, shop-owners who are at risk for robbery, and even high-school teachers who are confronted with increasing violence in schools. These professionals have in common that in an acute stress situation they are responsible for an effective resolution in order to prevent people and property from being damaged. In all these situations, professionals are likely to experience stress which may disrupt effective performance. Stress reactions, such as negative emotions (e.g., fear and anger), physiological overreactivity (e.g., palpitations, increased blood pressure), and dysfunctional cognitions (negative thoughts about oneself) degrade concentration, making it difficult to remain focused on the task (Gaillard, 2008; Tenenbaum, Edmonds, & Eccles, 2008).

People differ in the way they respond to acute stress situations. These individual differences can be explained by differences in psychological person characteristics, such as habits and beliefs. The present study examined three important person characteristics (i.e., coping style, coping self-efficacy, and metacognitive awareness) that predict the ability to maintain effective performance under acute stress. More specifically, the goal of the present study was to investigate through which processes differences in person characteristics influence performance under acute stress. According to Szalma (2008), it is important to examine the processes that underlie the effects of person characteristics on performance, because these can provide insights in how one could improve performance, for instance through training. The person characteristics included in this study are specifically relevant to the domain of stress and coping. In other words, they are not general personality traits but domain-specific person characteristics.

The present study addresses the call for studies that measure performance under acute stress in a realistic environment. Most studies on the effects of (acute) stress on performance have been conducted in controlled (laboratory) environments (see reviews of Staal, 2004; Salas, et al., 1996). However, most situations studied in laboratory environments are hardly comparable to the situations professionals may encounter (Salas et al., 1996). An alternative approach is to examine professionals in the field. Only a few studies have investigated the relationship between person characteristics and performance under acute stress in the field. The person characteristics studied are very diverse and results are equivocal. Gohm,

Baumann and Sniezek (2001) found a strong positive relationship between emotional clarity and self-reported cognitive difficulties of firemen. Meyerhoff, Saviolakis, Burge, Norris, Wollert, Atkins and Spielberger (2005) found a moderate negative relationship between trait anger and performance during a stressful police exercise. Stafford, Oron-Gilad, Szalma and Hancock (2004) found weak relationships between the Big 5 personality dimensions and police shooting performance. Eid and Morgan (2006) found no relationship between hardiness and performance during military survival training. Finally, LeBlanc, Regehr, Jelley and Barath (2008) found no relationship between coping styles and performance during police fire arms training. Therefore, more research is needed. In the present study, the relationship between person characteristics and performance during a realistic stressful military exercise was investigated in two independent military samples.

Coping behavior and performance

Professionals, confronted with an acute stress situation, have to perform certain tasks in order to control or resolve the situation. However, stress can degrade performance on these tasks because it draws attention to emotional and physiological reactions and away from the task at hand (Gaillard, 2008; Tenenbaum et al., 2008). To what extent stress degrades performance, depends largely on the effectiveness of coping behavior. Lazarus and Folkman (1984, p.141) define coping as a process: 'constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person'. In coping research, a distinction is made between two types of coping behavior: task-focused coping behavior and emotion-focused coping behavior. Task-focused coping behavior is aimed at modifying and eliminating the source of stress. Emotion-focused coping behavior is aimed at managing emotional distress itself (Folkman & Moskowitz, 2004; Matthews & Campbell, 1998; Endler & Parker, 1990; Lazarus & Folkman, 1984). Folkman and Lazarus (1985) found that people use both kinds of coping behavior during a stressful situation, and that they change their coping behavior in response to the characteristics of the situation.

Whether coping is effective depends on the nature of the situation. Several studies (e.g., Cohen, Ben-Zur, & Rosenfeld, 2008; Bagget, Saab, & Carver, 1996; Park, Folkman, & Bolstrom, 2001; Terry & Hynes, 1998; Zeidner, 1995) have shown that task-focused coping behavior is more effective in controllable situations (i.e., when something can be done, do it) and emotion-focused coping behavior is more effective in uncontrollable

situations (i.e., when nothing can be done, try to relax). However, Lazarus and Folkman (1984) have underlined that in some controllable situations, emotion-focused coping behavior might be effective as well. It facilitates task-focused coping behavior by lowering distress that interferes with task-focused coping behavior. In line with this, Folkman and Lazarus (1985) found that emphasizing the positive (a form of emotion-focused coping) was positively related with task-focused coping. Recently, research into coping flexibility has shown that the ability to adapt coping behavior to the demands of the situation is highly effective (Folkman & Moskowitz, 2004; Cheng, 2001).

In the present study, performance in a controllable acute stress situations (i.e., when something can be done about the situation) was examined. In these situations, professionals are expected to act in order to reduce the risk of serious damage. Because the situation is controllable, task-focused coping behavior is hypothesized to be effective. The nature of an acute stress situation (sudden, intense and requiring an immediate response) leaves little time for emotion-focused coping, because every second counts and immediate solutions are requested. Hence, for this situation, emotion-focused coping behavior was hypothesized not to be effective.

Person characteristics and coping behavior

Theory and research indicates that coping behavior, in turn, is affected by certain person characteristics. As such, coping behavior appears to mediate the relationship between these person characteristics and performance under stress. In the present study, coping style, coping self-efficacy and metacognitive awareness were studied, because they are considered to be important predictors of coping and performance under acute stress.

Coping style refers to people's habitual way of coping with stressful situations. Several scholars have distinguished between coping style and coping behavior (e.g., Ptacek, Pierce, & Thompson, 2006; Ben-Zur, 1999; Carver & Scheier, 1994). Coping behavior refers to people's response to a specific stressful situation and is a situational variable which changes in response to the situation. Coping style is considered a more or less stable person characteristic (Carver & Scheier, 1994). Similar to coping behavior, a distinction can be made between task-focused coping style and emotion-focused coping style (Lazarus & Folkman, 1984). Coping style is assumed to affect the relationship between stress and performance, because it affects coping behavior (e.g., Carver & Scheier, 1994; Endler & Parker, 1990). Although coping in a specific situation is a dynamic process (Folkman &

Lazarus, 1985), people develop habitual ways of coping which influence coping behavior in a range of different situations (Carver & Scheier, 1994). Several studies have supported this notion. In general, moderate to strong relationships have been found between coping style and coping behavior. In these studies, students were asked to report their coping behavior during the most stressful event in the past months (Carver, Scheier, & Weintraub, 1989; Ptacek et al., 2006), during laboratory tasks (Matthews & Campbell, 1998), or before an exam (Carver & Scheier, 1994; Endler & Parker, 1994). In line with this theoretical and empirical evidence, it was hypothesized that people with an emotion-focused coping style use more emotion-focused coping behavior, whereas people with a more task-focused coping style use more task-focused coping behavior under acute stress.

In the last decade, self-efficacy has received much attention as a driving force of goal directed behavior. Bandura (1997, p.3) states that 'if people believe they have no power to produce results, they will not attempt to make things happen'. Beliefs about personal efficacy guide courses of action, effort, perseverance, resilience to adversity, and even the amount of stress that is experienced (Bandura, 1997). In the present study, coping self-efficacy was included because it is considered to be an important driver in goal-directed behavior during stressful situations. Coping self-efficacy refers to people's beliefs about their ability to cope with an acute stress situation. People with strong coping self-efficacy are more confident in their ability to cope with stressful situations, therefore believe they can do something to change the situation, and thus use more task-focused and less emotion-focused coping behavior. This is in line with Lazarus and Folkmans (1984, p. 65) notion that people's confidence in their ability to master the environment is an important predictor of the coping process. Several studies have confirmed that coping self-efficacy is related to coping behavior (e.g., Haney & Long 1995; Chwalisz, Altmaier, & Russel, 1992; Ozer & Bandura, 1990). For example, Chwalisz et al. (1992) found that high-school teachers with strong coping self-efficacy used more task-focused coping behavior and less emotion-focused coping behavior during the most stressful event they experienced in an academic year. In line with these findings, coping self-efficacy was hypothesized to positively affect task-focused coping behavior, and negatively affect emotion-focused coping behavior in an acute stress situation.

Finally, metacognitive awareness was included in the present study, because it was thought to affect coping flexibility, that is the ability to effectively modify coping behavior in order to meet the demands of the current situation. An important prerequisite for coping flexibility is to have

insight in one's own stress responses and coping behavior, and in one's ability to regulate these responses and behaviors. We defined the concept of metacognitive awareness about stress and coping as a process which encompasses *insight in one's emotional and physiological reactions and coping behaviors during stressful situations, and the conscious regulation of these reactions and behaviors*. The importance of metacognitive awareness has been acknowledged in the educational domain (Schraw & Dennison, 1994). Studies in academic and physical education showed that students with strong metacognitive awareness choose more effective learning strategies and perform better (e.g., Theodosiou & Papaionnou, 2006; Schraw & Dennison, 1994; Meloth, 1990). To our knowledge, the concept of metacognitive awareness has not yet been applied to stress and coping research. However, the importance of awareness about stress and coping has been acknowledged since the development of cognitive-behavioral therapy for anxiety disorders and stress management training programs, such as Stress Inoculation Training (e.g., Johnston & Cannon-Bowers, 1996; Meichenbaum, 1985). An assumption of these programs and therapies is that people who are able to reflect upon, and regulate their coping behavior, use more effective ways of coping.

Because the present study focused on controllable stress situations, it was hypothesized that people with a strong metacognitive awareness, use more task-focused coping behavior and less emotion-focused coping behavior, because they are more aware of the effectiveness of the former and ineffectiveness of the latter in this kind of situation, and are able to regulate their coping behavior.

Method

Participants

In the present study, two independent samples were investigated. Sample 1 consisted of officer cadets of the Netherlands Defence Academy (NLDA) in basic military officer training. The main goals of this 18-week training is to acquire basic military drills and skills, military discipline and leadership, and to adjust to military life. The training period consists of classroom education and field-exercises. A total of 122 officer cadets (108 male, 14 female, mean age of 20.52 years) participated in all measures. Sample 2 consisted of recruits in basic military training of the Dutch Air Mobile Brigade. This training is 22 weeks and trains the recruits to be a basic level infantry soldier with Air Mobile Skills. The training consists of both classroom lessons and field exercises and aims to train infantry skills and

drills, stress resilience and military discipline. In total 132 recruits (all men, mean age of 19.15) participated in all measures.

Procedure

All participants were informed about the goals of the study in the first week of military training. Coping style, coping self-efficacy, and metacognitive awareness (T1) were measured during a survey-session in a classroom 1 to 2 weeks before the exercise when coping behavior and performance was measured (T2). The first measurement took place in training week 17 for Sample 1 and in week 15 for Sample 2.

In order to choose an adequate military exercise to measure performance under acute stress, several military exercises within the basic military training period of both the Netherlands Defense Academy and the Air Mobile Brigade were observed. On the basis of these observations, for both samples a military self-defense exercise was selected. This exercise took place during training week 18 for Sample 1 and during training week 17 for Sample 2. The exercises were known among instructors and participants as very stressful; participants would be placed in a situation in which they had to defend themselves against two or three opponents. These exercises were conducted as usual except that the cadets and recruits, and military instructors were asked to fill out a questionnaire afterwards.

For both exercises, the main goal was to train stress resilience by raising awareness about the possible performance decrements due to stress. In addition, the cadets and recruits were expected to show discipline (i.e., listen to and follow instruction), stress resilience (i.e., execute assignment despite stress), perseverance (i.e., willingness to fight even when outnumbered by opponents), use proportional violence (i.e., do not use more violence than is called for by the situation), and show proper military self-defense skills. For both samples, before the exercise started, the participants were told they should imagine that they were separated from their group in a hostile city and that their goal was to return to a rendezvous point as fast a possible. The participants had to walk through a mock-village in which they encountered five scenarios. In four scenarios they met one or more opponents that used force against them and they had to defend themselves using their military self-defense skills. In another scenario they were verbally harassed by a ‘civilian’ and they had to show proportional violence. For both samples the exercise took about ten minutes. After the exercise, participants were asked to fill out a questionnaire measuring coping behavior during the exercise. In addition, a performance evaluation was requested from the military instructor.

Measures

Performance. Ratings of experts were used to assess overall performance during the exercise (i.e., performance evaluation). In both samples, military instructors evaluated the participants' performance on the five relevant training goals (i.e., discipline, stress resilience, perseverance, using proportional violence, and military self-defense skills). They evaluated the performance on a 5-point Likert scale ranging from 1 (bad) to 5 (very good). The performance evaluation measures showed good internal reliability for both samples (Sample 1: Cronbach's $\alpha = .81$; Sample 2: Cronbach's $\alpha = .75$).

Coping behavior. The Coping Inventory for Task Stressors (CITS) developed by Matthews and Campbell (1998) was used to measure coping behavior during the stressful exercise. The subscales task-focused coping (7 items) and emotion-focused coping (7 items) were used. Examples of items are respectively: 'Made every effort to achieve my goals' and 'Worried about my inadequacies'. Response format was on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*). Participants were asked to report the coping behavior they used during the exercise. Items were translated in Dutch using back translation. Cronbach's alphas were sufficient for both task-focused coping behavior (Sample 1: $\alpha = .67$; Sample 2: $\alpha = .72$) and emotion-focused coping behavior (Sample 1: $\alpha = .76$; Sample 2: $\alpha = .83$).

Coping style. The Coping Inventory for Stressful Situations (CISS) (Endler & Parker, 1990) was used to measure coping style**.** The subscales task-focused coping style (16 items) and emotion-focused coping style (16 items) were used. Examples of items are respectively: 'Work to understand the situation' and 'Blame myself for being too emotional about the situation'. Response format was on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*). We used the Dutch version of the CISS, translated and validated by Ridder and Heck (1999). Cronbach's alphas were sufficient for both task-focused coping style (Sample 1: $\alpha = .79$; Sample 2: $\alpha = .82$) and emotion-focused coping style (Sample 1: $\alpha = .88$; Sample 2: $\alpha = .86$).

Coping self-efficacy. To measure coping self-efficacy, we developed a coping self-efficacy scale appropriate for basic military training which measured perceived capability to cope with and perform well during a stressful military exercise. The scale consisted of 11 items which were formulated on the basis of Bandura's definition of self-efficacy (Bandura, 1997). Reliability and validity was tested in a pilot study at the Netherlands Defense Academy (n = 89). An example item is: 'I am confident that I will

be able to focus on my task, even when I feel anxious' and 'I am confident I will be able to control my fear during threatening circumstances'. Response format was a 10-point Likert scale ranging from 1 (*not confident*) to 10 (*very confident*). The reliability of the scale was good (Sample 1: $\alpha = .87$; Sample 2: $\alpha = .89$).

Metacognitive awareness. To measure metacognitive awareness, we developed the metacognitive awareness about stress and coping (MASC) scale. The scale was based on the metacognitive awareness scale for the educational domain by Schraw and Dennison (1994). The MASC measures insight in one's emotional and physiological reactions to stress, insight in one's coping behavior during a stressful situation, and monitoring and evaluation of reactions, coping behavior and subsequent performance during and after a stressful situation. Example items are 'I know how my body reacts in stressful situations', 'I know which ways to cope with stress work for me', 'During a stressful situation I try to be aware of my emotional reactions', and 'After a stressful exercise I think about how I reacted'. Response format was on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*). We started with 52 items in total and tested reliability and validity in a pilot study at the Netherlands Defense Academy ($N = 89$). Based on the results of the pilot study, we reduced the total amount of items to 26 for the present study. The reliability of this scale was good (Sample 1: $\alpha = .91$; Sample 2: $\alpha = .87$).

Results

Means, standard deviations, and correlations of Sample 1 and Sample 2 are depicted in Table 1. Structural Equation Modeling (SEM) was used to test the hypotheses because it provides a stringent test of the relationships within the context of the model, and it enabled us to test whether the model was equal for both samples using multigroup analysis (Kline, 2005).

Multiple fit indices were used to assess model fit. The comparative-fit index (CFI) (Hu & Bentler, 1999) and the Goodness-of-Fit index (GFI) (Jöreskog & Sörbom 1981) indicate a good fit when they exceed .9. The root mean squared error of approximation (RMSEA) indicates good fit when it is lower than .05 and sufficient fit when lower than .08 (Kline, 2005). The Standard Root Mean Residual (SRMR) indicates a good fit when values are below .10 (Kline, 2005). The analyses were performed with the software-package AMOS 17.0 (Arbuckle, 2007).

Table 1. *Means, Standard Deviations, and Correlations of Sample 1 and Sample 2*

Variable	*Sample 1*		*Sample 2*								
	M	*SD*	*M*	*SD*	1	2	3	4	5	6	7
1 Task FC style	3.88	.36	3.75	.37		-.25**	.40**	.45**	.27**	.03	.06
2 Emotion FC style	2.05	.48	2.18	.58	-.21*		-.23**	-.45**	-.20*	.21*	.07
3 Metacognitive awareness	3.81	.40	3.53	.41	.47**	.00		.60**	.19*	.06	-.06
4 Coping self-efficacy	7.93	.81	7.89	.89	.41**	-.47**	.26**		.13	-.05	-.09
5 Task FC behavior	3.50	.62	3.79	.53	.23**	-.13	.22*	.31**		-.21*	.24**
6 Emotion FC behavior	2.28	.80	1.82	.60	-.07	.28**	-.02	-.06	-.12		-.38**
7 Performance	3.22	.80	3.58	.60	.15	-.04	.13	.02	.29**	-.29**	

*Note. FC = Focused Coping. Correlations for Sample 1 are above the diagonal and for Sample 2 below the diagonal. ** p <.01, * p < .05.*

Goodness of fit of the proposed model

Before testing the multigroup model, the goodness of fit of the model for the separate samples should be tested (cf. Byrne, 2001). The proposed model provided good fit on almost all indices for Sample 1: χ^2 (9) = 17.91, GFI = .96, CFI = .94, and SRMR = .07. RMSEA was .09 with a 90% confidence interval .02 -.15. These results are equivocal: the higher bound of .15 indicates poor fit, whereas the lower bound of .02 indicates good fit. According to Kline (2005), this kind of mixed result is more likely to happen in analyses with a small sample size. Taking into account the relatively small sample size of Sample 1, we concluded that the proposed model showed sufficient fit. In addition, the proposed model showed good fit on all indices for Sample 2: χ^2 (9) = 9.17, GFI = .98, CFI = 1.00, RMSEA = .01, SRMR = .05.

Next, we tested whether the model was equal for both samples. The outcomes of the multigroup analysis showed good fit for respectively the unconstrained model: χ^2 (18) = 27.08, GFI = .97, CFI = .97, RMSEA = .05, SRMR = .05; the structural weights model (with regression weights constrained to be equal): χ^2 (24) = 32.65, GFI = .97, CFI = .97, RMSEA = .04, SRMR = .06; and the structural covariances model (with covariances restraint to be equal): χ^2 (37)= 58.08, GFI = .94, CFI = .931, RMSEA = .05, SRMR = .07. In addition, the unconstrained model did not provide better model fit compared to the structural weights model or the structural covariances model. These results imply that the two samples did not differ in regression weights and covariances. Finally, the analysis showed that the samples do differ in residuals. This means that the unexplained variance differs per sample. From these results, it can be concluded that the causal structure of the proposed model is equivalent in both samples, providing a cross-validation of our model (Byrne, 2001).

Parameter estimates of proposed model

On the basis of the above analysis the parameter estimates calculated for the structural weights multigroup model are reported (Kline, 2005). A summary of results is given in Figure 1. Note that standardized regression weights differ per sample, because residuals differ per sample.

First, coping behavior was hypothesized to predict performance. As expected, emotion-focused coping behavior was negatively related to performance evaluation (B = -.30, p < .001; for Sample 1 β = -.30; for Sample 2 β = -.30), and task-focused coping behavior was positively related to performance evaluation (B =.27, p < .001; for Sample 1 β = .21; for

Sample 2 β = .24). Second, coping style was hypothesized to predict coping behavior. As expected, emotion-focused coping style was positively related to emotion-focused coping behavior (B = .31, p < .001; for Sample 1 β = .19; for Sample 2 β = .30), and task-focused coping style was positively related to task-focused coping behavior (B = .27, p < .05; for Sample 1 β = .16; for Sample 2 β = .19). Third, coping self-efficacy was hypothesized to predict coping behavior. In line with our expectations, the result showed that coping self-efficacy was positively related to task-focused coping behavior (B = .11, p < .05; for Sample 1 β = .14; for Sample 2 β = .18). Contrary to our expectations, coping self-efficacy was not related to emotion-focused coping behavior. Fourth, metacognitive awareness was hypothesized to predict coping behavior. This hypothesis was not confirmed. Metacognitive awareness did not predict task-focused coping behavior or emotion-focused coping behavior above and beyond the effect of coping style and coping self-efficacy. However, metacognitive awareness was positively correlated with task-focused coping behavior, but not with emotion-focused coping behavior in both samples.

In addition, we used bootstrapping in AMOS to assess the significance of the indirect effects. The results of these analyses showed that the indirect effect of task-focused coping style on performance was significant (indirect effect B = .07, p < .05; for Sample 1 β = .03; for Sample 2 β = .04), the indirect effect of emotion-focused coping style on performance was significant (B = -.09, p < .01; for Sample 1 β = -.06; for Sample 2 β = -.09) and the indirect effect of coping self-efficacy on performance was significant (B = .03, p < .01; for Sample 1 β = .03; for Sample 2 β = .04). These results indicate that coping behavior mediated the relationships of coping self-efficacy and coping style with performance under acute stress (Kline, 2005).

Discussion

The present study investigated whether coping style, coping self-efficacy, and metacognitive awareness predicted coping behavior and performance in a controllable acute stress situation. Coping behavior was expected to mediate between these person characteristics on the one hand and performance on the other.

The findings confirmed the importance of coping behavior for performance under acute stress. Military cadets and recruits performed better in a self-defense exercise when they were able to remain focused on the tasks assigned (i.e., task-focused coping behavior) and were able to

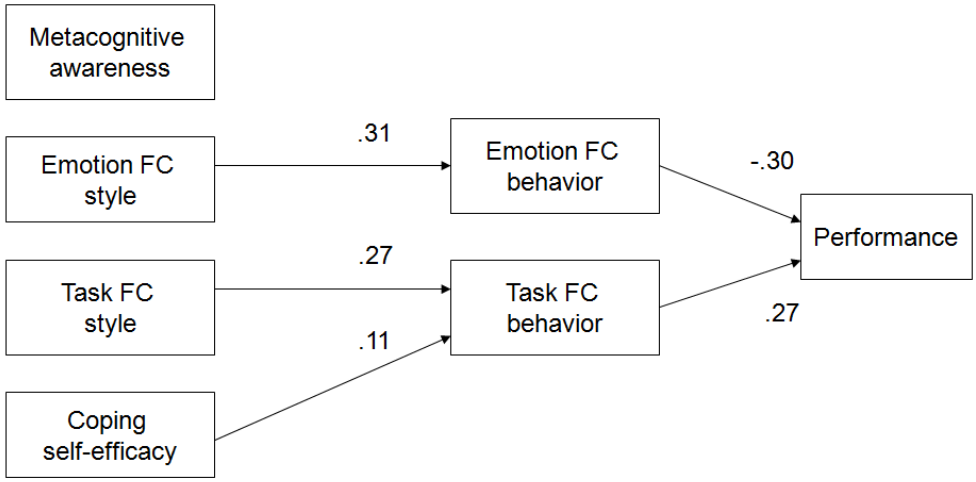

Figure 1. *Unstandardized estimates of multigroup analysis with structural weights constraint*
Note. FC = focused coping; All estimates are significant on p < .05 level

refrain from focusing on the distress they experienced (i.e., emotion-focused coping behavior). Only few studies have related coping behavior to objective (i.e., non-self-report) performance measures in an acute stress situation (Cohen, et al., 2008; Bagget et al., 1996; Zeidner, 1995). These studies were conducted with students and used either exams (Cohen, et al., 2008; Zeidner, 1995) or public speaking (Bagget et al., 1996) as acute stress situation. In the present study, coping behavior was examined in a realistic military exercise, encompassing physical threat. Since the scenario was quite realistic, it is likely the results can be generalized to situations professionals may encounter in the field.

These findings contribute to the debate about the effectiveness of coping behavior which has been central to coping research for a long time (see reviews by Folkman & Moskowitz, 2004; Zeidner & Saklofske, 1996). The results indicate that task-focused coping behavior is effective, whereas emotion-focused coping behavior is not. In other words, in a controllable acute stress situation, professionals should focus their attention on the source of the stress and the job they have to do, and refrain from managing their distress, because any lapses of attention may interfere with detecting upcoming danger in time and dealing with it effectively. However, this does not imply that emotion-focused coping cannot be beneficial at all in controllable situations. According to Lazarus and Folkman (1984), emotion-focused coping behavior may be beneficial in controllable situations,

because it may facilitate task-focused coping. It is possible that in the moments before and after a controllable acute stress situation, certain forms of emotion-focused coping are beneficial. For example, Carver and Scheier (1994) found that positive reframing (i.e., a form of emotion-focused coping) in the stage after a stressful encounter leads to positive challenge emotions. More research is needed to investigate the effectiveness of coping in different phases of an acute stress situation.

An important goal of the present study was to examine whether coping style, coping self-efficacy, and metacognitive awareness influence coping behavior and through that, performance. In line with our expectation, the results showed that coping style influenced coping behavior during an acute stress situation. People with a more emotion-focused coping style used more emotion-focused coping behavior, whereas people with a more task-focused coping style used more task-focused coping behavior. Moreover, coping style predicted coping behavior two weeks later in an acute stress situation. This confirms the assumptions made by several scholars (e.g., Ptacek, et al., 2006; Carver & Scheier, 1994) that coping behavior is influenced by habitual coping. In other words, although coping in a specific situation is very dynamic because the situation changes (Folkman & Lazarus, 1985), people do fall back to some extend on their habitual ways of coping.

In addition, the results showed that coping self-efficacy affects coping behavior. In line with Bandura's notion that self-efficacy beliefs are important determinants of the courses of action people choose, the findings showed that people with strong coping self-efficacy used more task-focused coping behavior. Contrary to our expectations, coping self-efficacy was not related to emotion-focused coping behavior. These results indicate that in a controllable acute stress situation, coping self-efficacy mainly works through its effect on task-focused coping behavior and not through emotion-focused coping behavior. In other words, people who trust their capabilities to cope with stress, engage in the situation more actively by focusing on the source of the stress and the task they have to do. This is in line with studies that assessed the effect of coping self-efficacy on coping behavior of teachers (Chwalisz et al., 1992), sportsmen (Haney & Long, 1995), and women after a self-defense training (Ozer & Bandura, 1990).

Contrary to our expectations, metacognitive awareness about stress and coping did not predict coping behavior above and beyond coping style and coping self-efficacy. However, metacognitive awareness was positively correlated with task-focused coping behavior. Metacognitive awareness was also correlated with coping style and coping self-efficacy. This pattern

suggests that the relationship between metacognitive awareness and task-focused coping behavior is mediated by coping style and coping self-efficacy. In other words, people with a strong metacognitive awareness, have a more task-focused coping style and stronger coping self-efficacy and therefore use more task-focused coping behavior. A possible explanation might be a 'learning' effect. In other domains (e.g., academics, sports), metacognitive awareness is considered as an important factor in learning. Studies have shown that students with strong metacognitive awareness reflect on how they learn, adopt effective learning strategies, and monitor and evaluate their learning (e.g., Schraw & Dennisson, 1994) which in the end leads to improved performance and self-confidence. This may also be the case for metacognitive awareness about stress and coping. More specifically, people with a strong metacognitive awareness reflect more on how they cope and how they can improve coping in the future. This may lead to a more effective coping style and increased confidence in their ability to cope, which could explain the relationships of metacognitive awareness with coping style and coping self-efficacy found in this study. However, because these variables were all measured at the same time, conclusions about the causal relationships between coping style, coping self-efficacy, and metacognitive awareness should be made with caution.

Finally, we expected that coping behavior would mediate between the person characteristics and performance. The results showed that coping behavior indeed mediated between coping style and coping self-efficacy on the one hand and performance on the other. This finding confirms the importance of coping behavior not only as predictor of performance, but also as a mechanism through which person characteristics affect performance.

Practical implications

Most studies that have investigated the effect of individual differences on coping behavior and performance under stress, examined personality traits, such as emotional stability (e.g., Stafford, et al., 2004) and meta-emotional traits (Gohm et al., 2001). Although these studies have implications for selection of professionals, they do not provide implications for training, because these personality traits are considered highly stable and therefore untrainable. In the present study, person characteristics that are more domain-specific and trainable were examined. Because these person characteristics can be changed, the results provide practical implications for training as well as selection. First, the results indicate that it can be beneficial for organizations to select professionals on the basis of their

coping style and coping self-efficacy, because they perform better under acute stress. In addition, the findings imply that training programs should aim to strengthen task-focused coping style and enhance coping self-efficacy. However, the results of the present study only apply to controllable acute stress situations. Professionals can also be confronted with low-control acute stress situations during their work. Consider, for example situations in which servicemen are not allowed to help or rescue civilians from hostile forces due to restrictive Rules of Engagement. In these low control stress situations, emotion-focused coping behavior may be more effective (e.g., Park, et al., 2001). In these cases, training programs should also focus on the effectiveness of different kinds of coping in different situations (i.e., training coping flexibility).

Strengths and limitations

This study has several strengths. Whereas most previous research is constrained because participants are students and the amount of stress experienced is moderate, the source of the stress in the present study was very realistic and strong with participants being confronted with uncertainty and potential physical harm. Moreover, the study used evaluation of military instructors as performance measure, in addition to self-report questionnaires. Compared to laboratory studies, the results of this field study can be generalized better to the stressful situations professionals may encounter in their work. Also, the use of two independent samples provided a cross-validation of the model, strengthening the validity of the findings.

However, the study is not without limitations. Although the evaluation of coping behavior and performance under acute stress in a realistic setting (military exercise) has clear advantages, it also has disadvantages. First, the sizes of the two samples were relatively small. Second, the expectations were assessed in one specific population (i.e., the military).

Conclusion

Professionals in a range of different jobs may encounter acute stress situations in their line of work, in which they are expected to act in order to ameliorate negative consequences for people and property. For organizations, it is important to know which person characteristics contribute to the ability to perform effectively in these situations. The present paper aims to advance insight in the way person characteristics influence performance under acute stress. The results showed that coping

behavior is an important predictor of performance during a controllable acute stress situation. The results also showed that coping style and coping self-efficacy are important predictors of coping behavior. The present paper introduced the concept of metacognitive awareness about stress and coping (MASC), which is related to coping self-efficacy and coping style, and could therefore be an important concept in the field of individual differences and coping.

The present study showed that investigating professionals in a realistic environment is a fruitful approach to enhance our understanding of performance under acute stress. Future studies should similarly use the field to assess coping and performance under acute stress, and investigate predictors of effective coping in different conditions and other samples. Future research on the model proposed in this paper can be beneficial for both researchers and practitioners, because it can clarify how person characteristics influence performance under acute stress. By examining the underlying processes that explain how and why certain individuals perform better under acute stress, we can learn how to improve the training of professionals who are confronted with acute stress during their work.

Chapter 4

Investigating coping style, coping self-efficacy, and the coping process during basic military training[9]

Abstract

For military organizations, it is important to develop insight in the person characteristics needed to perform in acute stress situations. The effect of coping style and coping self-efficacy on coping and performance under acute stress was examined in three military samples. In addition, the development of these person characteristics during military training was explored. The results showed that coping style and coping self-efficacy are related to appraisal and coping behavior. Both coping style and coping self-efficacy become more adaptive during basic military training. The results can be used to improve the training of servicemen.

Introduction

Nowadays military operations are characterized by increased violence. Missions such as the ones in Iraq and Afghanistan are constantly confronted with violent opposition. This largely consists of asymmetric warfare tactics, like Improvised Explosive Devices (IED's), ambushes, and suicide-attacks. Such situations place high demands on servicemen, because they are sudden, uncertain, ambiguous, and highly threatening (Driskell, Salas, & Johnston, 2006). These demands can cause acute stress in servicemen, which can seriously hamper performance (Gaillard, 2008; Tenenbaum, Edmonds, & Eccles, 2008; Harris, Hancock, & Harris, 2005). Nevertheless, servicemen have to be able to act deliberately and make decisions in line with Rules of Engagement and procedures (Krueger, 2008; Larsen, 2001). In other words, despite threatening circumstances that elicit acute stress, servicemen have to be able to execute their tasks and make decisions in uncertain situations.

One of the major challenges for military organizations is to adequately train servicemen for these kinds of situations. During basic

[9] This chapter is based on Delahaij, Gaillard, & Van Dam (2009a)

training and in the pre-deployment phase, military organizations invest heavily in training skills and drills in order to minimize possible performance decrements due to stress. Recently, the importance of integrating stress training into military training has been acknowledged (Thompson & McCreary, 2006) in order to improve servicemen's coping under acute stress. Stress training aims to enhance adaptive coping by training person characteristics that lead to adaptive coping (Johnston & Cannon-Bowers, 1997). However, whereas military organizations often have elaborate policies regarding skills and drills training, they are often less explicit about which person characteristics should be trained for in order to enhance coping under stress (Thompson & McCreary, 2006). A possible reason for this is the lack of knowledge about the person characteristics that influence coping. More knowledge about relevant person characteristics and how they influence coping under acute stress can help to develop better guidelines for training.

In the present study, two person characteristics, i.e. coping style and coping self-efficacy, were examined which are assumed to predict coping under stress. The goal of the study was to examine whether a) these person characteristics influence the coping process and the performance of servicemen in a stressful military exercise, and b) whether these person characteristics develop during basic military training. Three military samples were studied, from different types of basic military training (i.e. officer cadet training, Marine Corps training, Air Mobile Brigade training).

The coping process

The theoretical basis for the present study is the transactional theory of stress and coping of Lazarus and Folkman (1984). In their view, an individual's response to a stressful situation depends on the coping process. They define the coping process as 'constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person' (Lazarus & Folkman, 1984, p. 141). The coping process starts with the appraisal of the situation. A stressful situation can be appraised as 'threatening' (i.e., threat appraisal) or 'challenging' (challenge appraisal). A threat appraisal is more likely to occur when people believe they will not be able to manage the situation, whereas a challenge appraisal is more likely to occur when people believe they are able to manage the situation (Lazarus & Folkman, 1984). Threat appraisal is characterized by a focus on possible harm, negative emotions (e.g., fear, anxiety and anger) and an inappropriate energetic state (i.e., overreactivity). Challenge appraisal is characterized by a focus on

possible gain, positive emotions (e.g., eagerness and excitement) and an efficient mobilization of physiological resources (Gaillard, 2008; Blascovich, Seery, Mugridge, Norris, & Weisbuch, 2004; Folkman & Lazarus, 1985). The appraisal of the situation influences the coping behavior during a stressful situation. Lazarus and Folkman (1985) make a distinction between two types of coping behavior. Emotion-focused coping behavior refers to coping efforts aimed at managing the emotional distress itself. Task-focused coping behavior refers to coping efforts aimed at modifying and eliminating the source of the stress. People that appraise a situation as threatening tend to use more emotion-focused coping behaviors, and people that appraise a situation as challenging tend to use more task-focused coping behaviors (Folkman & Lazarus, 1985).

Whether coping is effective depends on the nature of the situation. Several studies (e.g., Cohen, Ben-Zur, & Rosenfeld, 2008; Bagget, Saab, & Carver, 1996; Park, Folkman, & Bolstrom, 2001; Terry & Hynes, 1998; Zeidner, 1995) have shown that task-focused coping behavior is more effective in controllable situations (i.e., when something can be done to prevent the harm, do it) and emotion-focused coping behavior is more effective in uncontrollable situations (i.e., when nothing can be done, try to relax). However, Lazarus and Folkman (1984) have underlined that in some controllable situations, emotion-focused coping behavior can be effective as well, because it may facilitate task-focused coping behavior by lowering distress. The present study focused on controllable acute stress situations in which people can manage the situation by taking action and performing a certain task. Hence, task-focused coping behavior is assumed to be effective. In addition, the nature of an acute stress situation (sudden, intense and requiring an immediate response) leaves little time for emotion-focused coping to be effective. In other words, because in an acute stress situation every second counts and immediate actions are requested, emotion-focused coping behavior will probably only distract people from finding possible solutions, and therefore is assumed to be ineffective.

In sum, in the present study, it was hypothesized that in an acute stress situation: a) task-focused coping behavior is positively related to performance, b) emotion-focused coping behavior is negatively related to performance, c) challenge appraisal is positively related to task-focused coping behavior and negatively to emotion-focused coping behavior, and d) threat appraisal is positively related to emotion-focused coping behavior and negatively to task-focused coping behavior.

Coping style and coping self-efficacy

Coping style and coping self-efficacy are assumed to influence the coping process. Coping style refers to people's habitual way of coping (Carver & Scheier, 1994). Several scholars have distinguished between coping style and coping behavior (e.g., Ptacek, Pierce, & Thompson, 2006; Ben-Zur, 1999; Carver & Scheier, 1994). Coping behavior refers to people's response to a specific stressful situation and is a situational variable which changes in response to the situation. Coping style is considered a relatively stable person characteristic (Carver & Scheier, 1994). Similar to coping behavior, a distinction is made between task-focused coping style and emotion-focused coping style (Lazarus & Folkman, 1984). Coping style is assumed to affect the coping process, because it affects coping behavior directly (e.g., Carver & Scheier, 1994; Endler & Parker, 1990). In other words, people's habitual way of coping influences coping behavior in an acute stress situation. Several studies have shown that coping style influences coping behavior in a range of different situations (e.g., Ptacek et al, 2006; Matthews & Campbell, 1998; Carver & Scheier, 1994; Endler & Parker, 1990).

Coping self-efficacy refers to people's beliefs about their capabilities to cope with stressful situations (Bandura, 1997). According to Bandura 'people who have a high sense of coping efficacy adopt strategies and course of action designed to change hazardous environments into more benign ones' (Bandura, 1997, p. 141). People confident in their ability to cope, believe they have personal control over the situation, and therefore will try to actively manage the stressful situation (i.e., show task-focused coping behavior). Several studies have confirmed the relationship between coping self-efficacy and coping behavior (e.g., Haney & Long, 1995; Chwalisz, Altmaier, & Russel, 1992; Keinan, 1983). This is also in line with Lazarus and Folkman (1984), who underline that beliefs about capabilities to control the environment are important predictors of the coping process: people who believe they are able to effectively cope with the situation will appraise the situation as more challenging and less threatening (e.g., Karademas & Kalantzi-Azizi, 2004), and therefore use more task-focused and less emotion-focused coping behavior. Thus, appraisal seems to mediate between coping self-efficacy and coping behavior.

In sum, coping style and coping self-efficacy both affect the coping process, but in different ways. Coping style directly influences coping behavior, whereas coping self-efficacy affects the coping behavior via appraisal. In the present study, it was hypothesized that in an acute stress situation: a) people with a more task-focused coping style use more task-focused coping behavior, and b) people with a more emotion-focused

coping style use more emotion-focused coping behavior. It also was hypothesized that in an acute stress situation: a) strong coping self-efficacy leads to a strong challenge appraisal and weak threat appraisal, b) a strong challenge appraisal leads to more task-focused and less emotion-focused coping behavior, and c) a strong threat appraisal leads to less task-focused and more emotion-focused coping behavior. Thus, challenge and threat appraisals were hypothesized to mediate between coping self-efficacy and coping behavior.

Method

Participants

Participants were officer cadets of the Netherlands Defence Academy enrolled in 18 weeks of basic military training (Sample 1), infantry recruits enrolled in 22 weeks of basic military training of the Netherlands Air Mobile Brigade (Sample 2), and recruits enrolled in 33 weeks of basic military training of the Netherlands Marine Corps (Sample 3). Especially the latter two basic military training programs have much attrition (around 50 %). Cadets or recruits that did not finish the training were excluded from the analyses. Sample 1 consisted of 186 participants in total (25 women, 161 men), with a mean age of 20.62 years. Sample 2 consisted of 144 participants in total (all men), with a mean age of 19.15 years. Sample 3 consisted of 83 participants in total (all men), with a mean age of 18.84 years. Cadets of the Netherlands Defence Academy have higher educational levels compared to recruits of the Air Mobile Brigade and Marine Corps, because they need to have a higher level high school degree to be accepted in the training.

Sample size may differ per analysis, because of missing values. Sample size will be reported for each analysis separately.

Procedure

The present study consisted of four measurement moments during basic military training. Three of these measurements entailed survey sessions. The first session (T1) took place during the first week of training. Participants were informed about the goals of the study and coping style was measured. Coping self-efficacy was not yet measured, because the participants had no experience with coping during a military exercise and therefore could not make an adequate assessment (cf. Bandura, 1997). In both the second session (T2) conducted around the middle of the training, and in the third

session (T3) in the last two weeks of the training period, coping style and coping self-efficacy were measured.

The fourth measurement was conducted during a stressful exercise to assess appraisal, coping behavior and performance under acute stress. For Sample 1 and 2, a military self-defense exercise was used. Cadets and recruits had to go through a mock village, where they encountered several scenarios in which they had to defend themselves. This exercise was known to be very stressful, because the cadets and recruits had to defend themselves against multiple opponents. The cadets (Sample 1) were given an additional assignment: they were instructed to remember 6 characters (letters and numbers) which were posted alongside the route. For Sample 3, an exercise to train drills to escape from a helicopter in the water ('heliditch') was used. This exercise was also very stressful, because it entailed being submerged under water for a longer period. Moreover, when they did not complete the exercise successfully, they were not allowed to work as a Marine. For Sample 1, the exercise took place after T3. For Sample 2 and 3, the exercise took place before T3. The exercises were conducted as usual, except that we asked recruits and cadets to fill out a questionnaire immediately after the exercise, measuring appraisal and coping behavior.

Measures

Coping style. Coping style was measured by the Coping Inventory for Stressful Situations (CISS) (Endler & Parker, 1994). The scales task-focused coping style (16 items) and emotion-focused coping style (16 items) were used in this study. Typical examples of items are respectively: 'Work to understand the situation' and 'Blame myself for being too emotional about the situation'. Response format was on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). We used the Dutch version of the CISS, translated and validated by Ridder and Heck (1999).

Coping self-efficacy. On the basis of Bandura's definition of self-efficacy (Bandura, 1997), we constructed a coping self-efficacy scale appropriate for basic military training to measure perceived capability to perform well during a stressful military exercise. The scale consisted of 11 items. Typical examples of items are: 'I am confident that I will be able to focus on my task, even when I feel anxious' and 'I am confident I will be able to control my fear during threatening circumstances'. Response format was a 10-point Likert scale ranging from 1 (not confident) to 10 (very confident).

Threat and challenge appraisal. To measure appraisal, we used the Stress Questionnaire (Folkman & Lazarus, 1985). The Stress Questionnaire measures emotional states that are considered to reflect challenge and threat appraisal. The subscales threat (3 items: worried, fearful, and anxious) and challenge (3 items: confident, hopeful, and eager) were used. Response format was a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). Participants were asked to report the emotions they experienced during the exercise.

Coping behavior. To measure coping behavior, the Coping Inventory for Task Stressors (CITS) developed by Matthews and Campbell (1998) was used. The subscales task-focused coping (7 items) and emotion-focused coping (7 items) were used. Typical examples of items are respectively: 'Made every effort to achieve my goals' and 'Worried about my inadequacies'. Response format was a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). Participants were asked to report the coping behavior they used during the exercise.

To test whether emotion-focused coping behavior, task-focused coping behavior, challenge and threat appraisal represented separate factors, confirmatory factor analysis was conducted. Multiple fit indices were used. The comparative-fit index (CFI) (Hu & Bentler, 1999) indicates a good fit when it exceeds .9. The root mean squared error of approximation (RMSEA) indicates good fit (i.e., close approximate fit) when it is lower than .05 and sufficient fit when it is lower than .08 (Kline, 2005). The Standard Root Mean Residual (SRMR) indicates a good fit when values are below .10 (Kline, 2005). The analyses were performed with the software-package AMOS 7.0.

The initial analyses did not provide sufficient model fit for all three samples. The analyses indicated that two items of the emotion-focused coping behavior scale behavior loaded on the threat scale (i.e., 'Worried about what I should do next' and 'Blamed myself for not doing better'). In addition, one item of the task-focused coping behavior scale loaded on the emotion-focused coping behavior scale ('Was careful to avoid mistakes'). Consequently, we omitted these items from the scales in order to get independent measures. Reliability of these altered scales was sufficient (see Table 1). The analyses with the revised emotion-focused and task-focused coping behavior scales provided sufficient model fit for Sample 1, χ^2 (113, N = 122) = 171.4, CFI = .91, SRMR = .08, RMSEA = .06; Sample 2, χ^2 (113, N = 130) = 146.8, CFI = .94, SRMR = .08, RMSEA = .05; and Sample 3, χ^2 (113, N = 74) = 136.3, CFI = .94, SRMR = .08, RMSEA = .05.

Performance. Performance could only be measured for Sample 1. As part of the exercise, the participants of Sample 1 were instructed to remember a coordinate of 6 characters (numbers and letters) that was posted alongside the route. During the exercise the six characters of the coordinate were attached at eye level to walls they had to pass. This assignment was used to test whether the cadet officers were able to observe the surroundings effectively in an acute stress situation; which is a very important capability for servicemen. The number of correctly remembered characters (range: 0-6) was used as performance measure.

Results

Performance and coping behavior

The mean score of performance (for Sample 1) was slightly above the scale's central value (range 0-6, $M = 3.40$, $SD = 2.00$). In other words, on average the participants correctly remembered between 3 and 4 characters. Regression analysis was used to assess the relationship between coping behavior and performance. The model was significant ($R^2 = .45$, $p < .001$, $N = 122$). In line with the hypotheses, task-focused coping behavior was positively related to performance ($\beta = .40$, $p < .001$). In addition, a marginally significant relationship was found between emotion-focused coping behavior and performance ($\beta = -.15$, $p < .1$). This negative relationship was in line with the expectations.

Coping style, coping self-efficacy, appraisal and coping behavior

Structural Equation Modeling (SEM) was used to test our hypotheses regarding the effects of coping style and coping self-efficacy on appraisal and coping behavior, because it provides a stringent test of the bivariate relationships within the context of the model and it enabled us to assess whether the relationships are equal for all samples using multigroup analysis (Kline, 2005). The coping style and coping self-efficacy measures were taken before the exercise. For Sample 1 this was T3, and for Sample 2 and 3 this was T2. Means, standard deviations, sample size and reliability coefficients for this analysis are given in Table 1 (for correlation tables contact the first author). The disturbance terms of challenge and threat appraisal were allowed to be correlated, because threat and challenge appraisal are subscales of the same scale, and they are not orthogonal.

Table 1. *Means, standard deviations, sample size and reliabilities for variables included in structural equation modeling analyses separate for each sample*

Variable	Sample 1 (N =122)			Sample 2 (N =130)			Sample 3 (N =74)		
	M	*SD*	*alpha*	*M*	*SD*	*alpha*	*M*	*SD*	*alpha*
Task FC style	3.88	.36	.83	3.75	.37	.79	3.74	.43	.85
Emotion FC style	2.06	.46	.86	2.18	.58	.89	2.30	.49	.83
Coping self-efficacy	7.93	.81	.89	7.88	.90	.88	8.00	1.03	.92
Challenge appraisal	2.71	.73	.82	2.94	.51	.63	3.18	.57	.64
Threat appraisal	1.93	.67	.77	1.49	.47	.71	1.25	.43	.87
Task FC behavior	3.44	.63	.67	3.72	.53	.62	3.74	.62	.68
Emotion FC behavior	2.23	.86	.76	1.76	.59	.66	1.22	.42	.63

Note. Coping style and coping self-efficacy measures for Sample 1 on T3, Sample 2 on T2 and Sample 3 on T2; FC = Focused Coping.

The fit indices provided sufficient model fit for Sample 1, χ^2 (9, N = 122) = 8.12, CFI = 1.00, SRMR = .04, RMSEA = .00; Sample 2, χ^2 (9, N = 130) = 13.17, CFI = .97, SRMR = .05, RMSEA = .06, and Sample 3, χ^2 (9, N = 74) = 13.68, CFI = .95, SRMR = .06, RMSEA = .08. The multigroup SEM analysis showed sufficient fit for the unconstrained model, χ^2 (27) = 35.01, CFI = .98, SRMR = .04, RMSEA = .03. The model with structural weights constraints (i.e., with equal regression weights) also showed good model fit, χ^2 (43) = 58.00, CFI = .96, SRMR = .05, RMSEA = .03. In addition, the unconstrained model did not provide better model fit compared to the model with structural weights constrained. This means the samples' regression weights do not differ (Byrne, 2001). This provides a cross-validation of our hypothesized relationships.

Since the results of the multigroup analysis showed that the samples did not differ with regard to regression weights, parameter estimates of the multigroup analysis with structural weights constraint are reported.

Table 2. *Means, standard deviations, and reliability of coping style and coping self-efficacy of the three samples at Time 1, 2, and 3*

Variable	Time	Sample 1			Sample 2			Sample 3		
		M	*SD*	*alpha*	*M*	*SD*	*alpha*	*M*	*SD*	*alpha*
Task FC style	T1	3.78	.41	.86	3.67	.42	.85	3.71	.42	.83
	T2	3.87	.38	.84	3.75	.40	.78	3.70	.50	.89
	T3	3.88	.37	.83	3.77	.38	.83	3.75	.40	.85
Emotion FC style	T1	2.08	.50	.88	2.27	.55	.87	2.40	.60	.89
	T2	2.03	.52	.88	2.18	.57	.88	2.28	.53	.85
	T3	2.06	.51	.87	2.14	.60	.91	2.30	.53	.88
Coping self-efficacy	T2	7.76	.77	.88	7.90	.88	.87	8.03	1.02	.92
	T3	7.89	.81	.89	8.25	.86	.93	8.21	.78	.91

Note. FC = Focused Coping.

Unstandardized estimates are reported, because the standardized estimates are not equal for the samples (See Figure 1, for standardized estimates per sample). As expected, emotion-focused coping style was positively related to emotion-focused coping behavior (b = .18, p < .01), and task-focused coping style was positively related to task-focused coping behavior (b = .38, p < .01). As expected, coping self-efficacy was positively related to challenge appraisal (b = .23, p < .01) and negatively related to threat appraisal (b = -.11, p < .01). As expected, threat appraisal was positively related to emotion-focused coping behavior (b = .43, p < .01). However, threat appraisal was not related to task-focused coping behavior. As expected, challenge appraisal was negatively related to emotion-focused coping behavior (b = -.17, p < .01), and positively related to task-focused coping behavior (b = .25, p < .01). In order to test the hypotheses regarding mediation, the significance of the indirect effects were calculated in AMOS using bootstrapping (cf. Kline, 2005). The results showed that the indirect effect of coping self-efficacy on task-focused coping behavior was significant (b = .06, p < .01), and that the indirect effect of coping self-efficacy on emotion-focused coping behavior was significant (b = -.09, p < .01). These results confirmed that appraisal mediates the relationship between coping self-efficacy and coping behavior.

Development of coping style and coping self-efficacy

Means, standard deviations and reliability coefficients for coping style and coping self-efficacy on Time 1 (T1), Time 2 (T2) and Time 3 (T3) for all samples are depicted in Table 2. To explore whether coping style and coping self-efficacy changed during basic military training paired t-tests were conducted. Sample 1 showed an increase in task-focused coping style from T1 to T2 (N = 141 , t = -.2.79, p < .01) and from T1 to T3 (N = 131 , t = -2.84 , p < .01), and a decrease in emotion-focused coping style from T1 to T2 (n = 141 , t = 2.29, p < .05). However, this change is relatively small (.05 points). In addition, Sample 1 showed an increase in coping self-efficacy from T2 to T3 (N = 133, t = -.2.08, p < .05). Sample 2 showed an increase in task-focused coping style from T1 to T2 (N = 103, t = -2.10, p < .05) and from T1 to T3 (N = 82 , t = -3.14 , p < .01), and a decrease in emotion-focused coping style from T1 to T3 (N = 82 , t = 2.08, p < .05). In addition, Sample 2 showed an increase in coping self-efficacy from T2 to T3 (N = 106, t = -.4.56, p < .01). The analyses on Sample 3 did not show significant differences on task-focused coping style between time points. Sample 3 did show a decrease in emotion-focused coping style between T1 and T2 (N = 81, t = 2.73, p < .01). Although there a small increase in coping

self-efficacy from T2 to T3 in Sample 3, this was not significant, probably due to low sample size ($N = 55$).

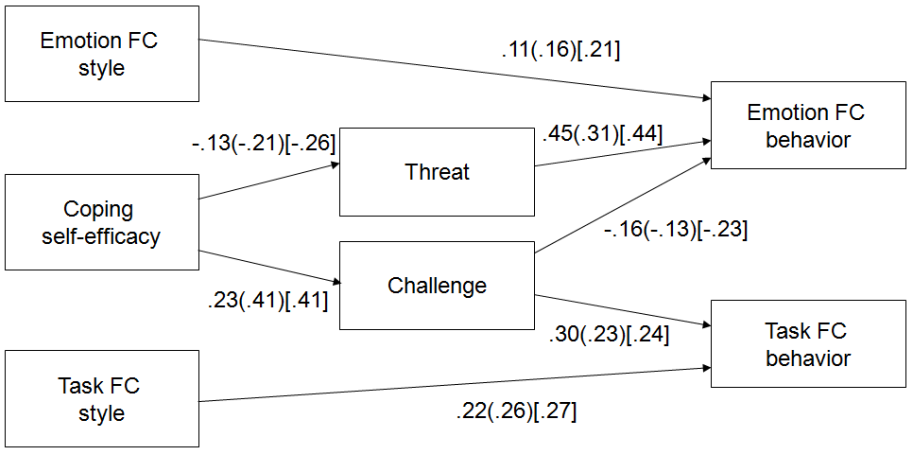

Figure 1. *Standardized parameter estimates of Sample 1, (Sample 2), and [Sample 3] of multigroup analysis with structural weights constraint*
Note. FC = focused behavior. All reported estimates $p < .01$.

Discussion

The present study showed that coping process is an important predictor of performance under acute stress. The person characteristics coping style and coping self-efficacy were found to influence the coping process, and coping behavior was found to affect performance during a highly stressful exercise was examined. We were able to corroborate our findings across the three military samples (i.e., officer cadets, Marine Corps recruits, and special infantry recruits).

The results showed that coping behavior plays an important role in the ability to maintain performance in a controllable acute stress situation. Staying focused on the task and on the source of the stress (i.e., task-focused coping behavior) and refraining from paying attention to the distress experienced (i.e., emotion-focused coping behavior) is effective. In addition, the results showed that the way people cope is dependent on their appraisal of the situation. People who appraised the situation as challenging used more effective coping behavior, whereas people who appraised the situation as threatening used less effective coping behavior.

The results also showed that the coping process was influenced by coping style and coping self-efficacy. The results showed that coping style directly influences coping behavior under acute stress. More specifically, when people preferred emotion-focused coping they tended to use more emotion-focused coping behavior, and when people preferred task-focused coping they tended to use of more task-focused coping behavior. This is in line with previous studies with civilian subjects that found moderate to strong relationships between coping style and coping behavior (e.g., Ptacek et al., 2006; Carver & Scheier, 1994). To our knowledge, the relationship between coping style and coping behavior has never been studied in a military population before.

In addition, the results showed that coping self-efficacy influences coping behavior through its effect on challenge and threat appraisals. More specifically, the situation was appraised as less threatening and more challenging when people were confident in their ability to cope and perform under acute stress. Subsequently, a strong challenge appraisal led to more task-focused and less emotion-focused coping behavior, and a strong threat appraisal led to more emotion-focused coping behavior. However, threat appraisal was not related to task-focused coping behavior. This implies that the effect of coping self-efficacy on task-focused coping behavior mainly works through challenge appraisals, while the effect of coping self-efficacy on emotion-focused coping behavior works through challenge and threat appraisals. Thus, people with a strong coping self-efficacy believe they can manage the situation and thus appraise the situation as less threatening and more challenging, and subsequently use more effective ways of coping. This is in line with Bandura (1997) and Lazarus and Folkman theory (1984) and previous studies with civilian and military subjects (e.g., Bandura, 1997; Haney, 1995; Chwalisz et al., 1992; Keinan, 1983).

To explore how coping style and coping self-efficacy changed over time, coping style and coping self-efficacy were measured at several moments during basic military training. The results showed that task-focused coping style increased and emotion-focused coping style decreased in officer cadets and infantry recruits. Emotion-focused coping style decreased for Marine recruits, whereas task-focused coping style remained the same. Although these changes are relatively small, the results indicate that basic military training can change coping style.

The results also showed that coping self-efficacy increased for officer cadets and infantry recruits during basic military training. Although the means of coping self-efficacy suggest that this is also the case for the Marine Corps recruits, no significant difference was found, which could be

due to the small sample size. We conclude that basic military training positively affects the development of coping self-efficacy. This is not surprising, as strengthening confidence in ability to cope with stressful situations is an important aim for basic military training.

Implications

The findings of the present study underline the importance of studying predictors of coping under acute stress, like coping style and coping self-efficacy. First, it shows the importance of monitoring and training coping style and coping self-efficacy during basic military training because they influence coping under acute stress. Second, gaining insight in the mechanism in which these person characteristics influence coping under stress, may improve training effectiveness, because it provides guidelines for instructors (e.g., focus on appraisal and coping behavior). Finally, our results showed that basic military training can influence the development of coping style and coping self-efficacy. Although the changes found in the present study were not very substantial, the results indicate that coping style and coping self-efficacy are malleable and therefore interesting topics for military training. Moreover, because these basic training programs did not have explicit protocols for training these person characteristics, it can be expected that the malleability of coping style and coping self-efficacy can be even greater when this is effectively captured in training protocols. In order to optimize the effect of basic military training on the development of person characteristics such as coping style and coping self-efficacy, future research should focus on training principles and individual differences in trainability of these person characteristics.

To conclude, the findings of the present study are important, because they indicate that military organizations can enhance coping under acute stress by training coping style and coping self-efficacy. However, we examined the relevance of coping style and coping self-efficacy for one type of situation only: a controllable acute stress situation. Therefore, the results cannot be generalized to uncontrollable acute stress situations or enduring stress. In addition, we only studied their influence on coping behavior and performance, and did not take into account other relevant outcomes, like mental health. Therefore, we suggest that future research should examine the relevance of coping style and coping self-efficacy for different stressors and outcomes within the military domain.

Chapter 5

Hardiness and the response to stressful situations: Investigating mediating processes[10]

Abstract

The present study investigated mediating processes that explain how hardiness influences the way people respond to a stressful situation. Coping style and coping self-efficacy were investigated as mediating variables. Using a longitudinal design, hardiness, coping style and coping self-efficacy, and responses (i.e., appraisal and coping) to a stressful military exercise were assessed at different points in time during basic military training in two independent samples (N = 109, N = 98). As hypothesized, coping self-efficacy mediated the relationship between hardiness and appraisal, whereas coping style mediated the relationship between hardiness and coping behavior. By showing that the relationships between hardiness and responses to a specific stressful situation are mediated by domain specific person characteristics such as coping style and coping self-efficacy, the present study contributes to existing theories about hardiness and its effects.

Introduction

Since Kobasa (1979) introduced the concept of hardiness as an important personality characteristic affecting the relationship between stress and health, many studies showed its relevance for health and performance (for reviews see Maddi, 2002; Funk, 1992). In general, it is assumed that hardy people perform better and stay healthier in the face of stress (e.g., Bartone, 1999; Maddi & Kobasa, 1984; William, Wiebe, & Smith, 1992). However, in a critical review of hardiness studies, Funk (1992) noted that the findings are equivocal, where sometimes only weak, and sometimes no relationships between hardiness and health are found. One possible explanation for this situation might be the existence of mediating processes underlying the relationship between hardiness and health and performance. Funk (1992) proposed that hardiness research should investigate these mediating processes, preferably using longitudinal designs. Although some studies

[10] This chapter is based on Delahaij, Gaillard, & Van Dam (2009b)

have focused on mediating processes (e.g., Williams et al., 1992; Wiebe, 1991), most of these studies relied on cross-sectional data (for exception see Florian, Mikulincer, & Taubman, 1995). The present study addresses the call for longitudinal research of mediating processes between hardiness and its outcomes.

Hardiness is characterized by three interrelated attitudes: control, commitment and challenge. Hardy people believe they have control over events they experience, are committed, and perceive changing environments as challenging and an opportunity for growth (Kobasa, 1979). According to Maddi and Kobasa (1984) hardiness influences the relationship between stress and health, because hardy people a) appraise stressful situation as less stressful, b) use more transformational ways of coping, c) have relationships that support effective coping, and d) have a more healthy life-style (see Funk, 1992). The focus of the present study was on the effects of hardiness on the response to a specific stressful situation and therefore the first two of the hypothesized pathways described above were investigated: a) hardiness affects appraisal, and b) hardiness affects coping.

The goal of the present study was to investigate these two pathways using Vallerand's (2000) distinction between global, contextual, and situational level variables. The global level consists of broad dispositions, such as hardiness, that are assumed to be stable over time and situations. These stable dispositions shape the contextual person characteristics at the second level, which are less general and more domain-specific. These contextual person characteristics affect the third level which is situational and consists of responses to a specific situation. The present study adopted a similar approach and investigated whether hardiness (i.e., global level) affects the domain-specific person characteristics coping style and coping self-efficacy (i.e., contextual level), which in turn influence how people appraise and react to a specific stressful situation (i.e., situational level).

A longitudinal design was used in which hardiness, domain-specific person characteristics and response to a stressful situation were measured at different moments and mediation was tested using path analyses. Moreover, two independent military samples in basic military training were assessed. This approach allows us to draw robust inferences about the mediating processes (cf. Funk, 1992). Now, these two mediating pathways will be discussed in more detail.

The hardiness-appraisal relationship

The rationale underlying the first pathway is that hardy people appraise stressful situations as less threatening, because they believe they can control

the situation and even learn from it (Kobasa, 1978). In other words, hardiness 'sensitizes people to the possible changeability of events' (Maddi, 1999, p.89). Thus hardy people believe their actions can affect the environment. These beliefs about the controllability of the environment have been shown to positively affect people's beliefs about personal efficacy (perceived self-efficacy) (Bandura & Wood, 1989). The belief that one can change the environment, stimulates people to take action to master environmental circumstances. These mastery experience in turn positively affect self-efficacy beliefs (i.e., the belief whether one is able to produce certain actions) (Bandura, 1997). In line with this reasoning, it was expected that hardiness affects coping self-efficacy of military recruits. Coping self-efficacy refers to people's beliefs about their ability to cope with a stressful situation (Bandura, 1997). To our knowledge, only Westman (1990) studied the relationship between hardiness and coping self-efficacy. She showed that hardy cadets were more confident in their ability to cope with a stressful military training.

According to Lazarus and Folkman (1984) people who believe they are able to cope with stressful situations (i.e., coping self-efficacy) will appraise that situation as more challenging and less threatening, because they belief they can control the situation to some extent. Karademas and Kalantzi-Azizi (2004) study confirmed that self-efficacy is positively related to challenge appraisal and negatively related to threat appraisal in an academic setting.

The aim of this study was to extend these findings by investigating whether coping self-efficacy mediates between hardiness on the one hand and appraisal during a stressful situation on the other. More specifically, it was hypothesized that a) hardy people have stronger coping self-efficacy, and that b) people with a strong coping self-efficacy appraise a stressful situation as more challenging and less threatening.

The hardiness-coping relationship

The rationale underlying the second pathway is that hardy people react more effectively in a stressful situation, because they tend to cope more actively with stressful situations. More specific, hardy people tend to use coping strategies aimed at turning the stressful situation into a more benign situation, such as task-focused coping, and refrain from coping that disengages them from the situation, such as emotion-focused coping or avoidance (Maddi, 2002; Kobasa, 1979).

When studying coping, a distinction should be made between coping behavior and coping style. Coping behavior refers to people's response to a

specific stressful situation and is a situational level variable which changes in response to the situation. Coping style is a relatively stable person characteristic which refers to people's habitual way of coping (Carver & Scheier, 1994), and is a contextual level variable. Most studies that investigated the relationship between hardiness and coping, do not acknowledge this distinction. Sometimes coping behavior is studied (e.g., Florian et al., 1995; Maddi, 1999; Williams et al., 1992), and sometimes coping style is studied (e.g., Beasley, Thompson, & Davidson, 2003; Soderstrom, Dolbier, Leiferman, & Steinhardt, 2000; Maddi & Hightower, 1999). For the present study, this distinction is relevant, because coping style and coping behavior are at different levels in Vallerand's (2000) framework. As such, coping style was expected to mediate the relationship between hardiness and coping behavior. In other words, hardy people react more effectively to a stressful situation, because they tend to use more effective coping strategies. Several studies have found that coping style influences coping behavior in a range of different situations (Matthews & Campbell, 1998; Carver & Scheier, 1994; Endler & Parker, 1994). In addition, several studies found a relationship between hardiness and coping style (e.g., Soderstrom et al., 2000; Maddi & Hightower, 1999). For example, Maddi and Hightower (1999) found that hardiness was positively related to active coping and planning, and negatively related to disengagement and denial. However, until now no studies have investigated whether coping style also mediates between hardiness and coping behavior. Therefore, the present study aimed to test this assumption. More specific, it was hypothesized that a) hardy people have a coping style that is more task-focused and less emotion-focused; and b) a task-focused coping style leads to task-focused coping behavior and an emotion-focused coping style leads to emotion-focused coping behavior in a specific stressful situation.

Method

Participants

Participants were officer cadets of the Netherlands Defence Academy enrolled in 18 weeks of basic military training (Sample 1), and infantry recruits enrolled in 22 weeks of basic military training of the Netherlands Air Mobile Brigade (Sample 2). Initially, 230 officer cadets and 123 infantry recruits participated in the study. However, during basic military training there is much attrition. In addition, not all participants were able to participate in all the measurements. Only participants who participated in all the measurements were included. Therefore, in the present study Sample 1

consisted of 109 participants in total (15 women, 94 men; mean age of 20.5 years), and Sample 2 consisted of 98 participants in total (all men; mean age of 19.1 years).

Procedure

During the first week of training, participants were informed about the goals of the study. Participants were informed that participation was voluntary, and that consent was implied by completion and return of the survey. In addition, hardiness was measured at this time (T1). Coping style and coping self-efficacy were measured in week 17 (Sample 1) and week 15 (Sample 2) (T2). For both samples a military self-defense exercise was chosen to measure appraisal and coping behavior. This exercise was known to be very stressful because the participants had to defend themselves against two or three opponents. The exercises were conducted as usual except that participants were asked to fill out a questionnaire afterwards (T3). This exercise took place during week 18 (Sample 1) and during week 17 (Sample 2).

Measures

Hardiness. Hardiness was measured with the Dispositional Resilience Scale-II (Sinclair, Oliver, Ippolito & Ascalon, 2003). This scale is based on Bartone's Dispositional Resilience Scale (Bartone, Ursano, Wright, & Ingraham, 1989), consist of 18-items and measures both positive and negative aspects of control (vs. powerlessness), commitment (vs. alienation) and challenge (vs. rigidity). Examples are, 'My successes are because of my effort and ability' (control), 'I often feel helpless' (powerlessness), 'I enjoy most things in life' (commitment), 'I usually feel alone in the world' (alienation), 'I take a head-on approach to facing problems in life' (challenge), and 'It bothers me when my daily routine gets interrupted'(rigidity). Reliability of the total hardiness scale was .80 (Sample 1), and .81 (Sample 2).

Coping style. Coping style was measured by the Coping Inventory for Stressful Situations (CISS) (Endler & Parker, 1994; Ridder & Heck, 1999). The scales task-focused coping style (16 items) and emotion-focused coping style (16 items) were used. Examples are respectively: 'Work to understand the situation' and 'Blame myself for being too emotional about the situation'. Response format was on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). Reliability for task-focused coping style was .83 (Sample 1) and .79 (Sample 2), and for emotion-focused coping style was .85 (Sample 1) and .88 (Sample 2).

Coping self-efficacy. We constructed a coping self-efficacy scale appropriate for basic military training to measure perceived capability to cope with and perform well during a stressful military exercise. The scale consisted of 11 items which were formulated on the basis of Bandura's definition of self-efficacy (Bandura, 1997). Examples are: 'I am confident that I will be able to focus on my task, although I feel anxious' and 'I am confident I will be able to control my fear during threatening circumstances'. Response format was on a 10-point Likert scale ranging from 1 (not confident) to 10 (very confident). Reliability was .86 (Sample 1) and .88 (Sample 2).

Threat and challenge appraisal. To measure appraisal, the Stress Questionnaire (Folkman & Lazarus, 1985) was used. The Stress Questionnaire measures emotional states which are considered to reflect challenge and threat appraisal. The subscales threat (3 items: worried, fearful, and anxious) and challenge (3 items: confident, hopeful, and eager) were used. Response format was on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). Participants were asked to report the emotions they experienced during the exercise. Reliability for threat was .69 (Sample 1) and .70 (Sample 2), and for challenge was .77 (Sample 1) and .67 (Sample 2).

Coping behavior. To measure coping behavior, the Coping Inventory for Task Stressors (CITS) (Matthews & Campbell, 1998) was used. The subscales task-focused coping (7 items) and emotion-focused coping (7 items) were used. Examples are respectively: 'Made every effort to achieve my goals' and 'Worried about my inadequacies'. Response format was on a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). Participants were asked to report the coping behavior they used during the exercise. Reliability for task-focused coping behavior was .69 (Sample 1) and .64 (Sample 2), and for emotion-focused coping behavior was .76 (Sample 1) and .81 (Sample 2).

Analysis plan

The aim of the analyses was to test whether our hypothesized mediation could be corroborated across samples, providing a cross validation of the theoretical model. Therefore, structural equation modeling (SEM) was used, because it provides a stringent test of the relationships within the context of the model and it enabled us to assess whether the relationships within our model are equal for two samples using multigroup analysis (Kline, 2005). Multigroup analysis in SEM is a sophisticated way of testing group equality

because it can be used to test equality of regression weights, covariances and residuals in the proposed model. However, testing a multigroup model increases the parameters to be tested and therefore complexity of the model. For the present study, the sample sizes were limited and therefore model complexity should be restricted (Kline, 2005). To restrict model complexity while using multigroup SEM, the two mediation pathways were tested separately instead of in one overall analysis.

Multiple fit indices were used. The comparative-fit index (CFI) (Hu & Bentler, 1999) and Goodness-of-Fit index (GFI) (Jöreskog & Sörbom 1981) indicate good fit when they exceed .09. The root mean squared error of approximation (RMSEA) indicates good fit when it is lower than .05 and sufficient fit when it is lower than .08 (Kline, 2005). The Standard Root Mean Square Residual (SRMR) indicates good fit when values are below .10 (Kline, 2005). The analyses were performed with the software-package AMOS 7.0.

Results

Table 1 shows the means, standard deviations, and correlations, for each sample. Note that hardiness does not correlate strongly with the situational variables (i.e., threat, challenge, emotion-focused and task-focused coping behavior). However, hardiness does consistently correlate with the contextual person characteristics (i.e., coping style and coping self-efficacy).

Hardiness, coping self-efficacy and appraisal

Goodness of fit. The disturbance terms of challenge and threat appraisal were allowed to correlate, because threat and challenge are subscales of the same scale, and they are not orthogonal. The model provided good fit for almost all fit indices for Sample 1: χ^2 (2) = 5.27, GFI = .98, CFI = .93, and SRMR = .05. However, RMSEA indicated bad fit (RMSEA = .12). The confidence interval (.00 - .25) is equivocal: the lower bound of .00 indicated good fit, whereas the upper bound of .25 indicates bad fit. According to Kline (2005) this is more likely to occur in relatively small samples. Taking into account the sample size and the other fit statistics, we concluded the model showed sufficient fit for Sample 1. The model provided good fit for Sample 2: χ^2 (2) = 2.41, GFI = .99, CFI = .99, RMSEA = .05, and SRMR = .04. The outcomes of the multigroup analysis showed good fit for respectively the unconstrained model: χ^2 (4) = 7.68, GFI = .98, CFI = .96, RMSEA = .07, and SRMR = .05; the structural weights model: χ^2 (7) = 14.49, GFI = .97, CFI = .92, RMSEA = .07, and SRMR = .07, and the

Table 1. *Means, Standard Deviations, and Correlations of Sample 1 and Sample 2*

Variable		*Sample 1*		*Sample 2*		1	2	3	4	5	6	7	8
		M	*SD*	*M*	*SD*								
1	Hardiness	3.90	.35	3.73	.37		.39**	-.21*	.21+	.26**	.04	.09	.10
2	Task FC style	3.86	.35	3.75	.40	34**		-.28**	.47**	.27**	.02	.05	.09
3	Emotion FC style	2.04	.47	2.22	.57	-.45**	-.18+		-.49**	-.18+	.17+	-.12	.05
4	Coping self-efficacy	7.89	.82	7.86	.90	.42**	.38**	-.41**		.11	-.04	.10	-.17+
5	Task FC behavior	3.49	.63	3.74	.50	.24*	.29**	.00	.31**		-.16+	.33**	-.09
6	Emotion FC behavior	2.25	.74	1.88	.67	-.12	-.06	.20*	-.03	.00		-.37**	.56**
7	Challenge	2.71	.72	2.92	.52	.31**	.31**	-.12	.44**	.29**	-32**		-.54**
8	Threat	1.92	.63	1.51	.47	-.13	-.02	.19+	-.20*	-.22*	.41**	-.35**	

*Note. FC = Focused Coping; Correlations for Sample 1 are above the diagonal, for Sample 2 are under the diagonal; ** p <.01, * p < .05, + p < .1.*

structural covariances model: χ^2 (8) = 14.95, GFI = .96, CFI = .93, RMSEA = .06, and SRMR = .08. In addition, the unconstrained model did not show better model fit compared to the models with regression weights and covariance equality constraints. Finally, the analysis showed that the samples did differ in residuals. From these results can be concluded that the causal structure of the proposed model is equivalent in both samples, providing a cross-validation of our model (Byrne, 2001).

Alternative model. Goodness of fit of a partial mediation model in which direct paths were added between hardiness and appraisal was assessed. This model did not show sufficient model fit.

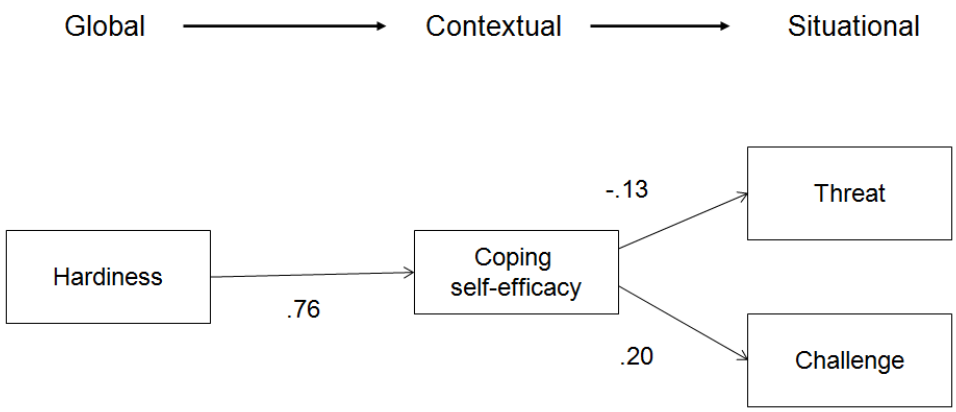

Figure 1. *Unstandardized estimates of multigroup analysis with structural weights constraints testing mediation between hardiness and appraisal*
Note. For all estimates p < .01

Parameter estimates. Because the multigroup analysis showed equality of regression weights, the parameter estimates of the multigroup model with equal regression weights are reported. Figure 1 shows a summary of results. As expected, hardiness was positively related to coping self-efficacy (B = .76, p <.01; β Sample 1 = .31; β Sample 2 = .32). In addition, coping self-efficacy was positively related to challenge (B = .20, p <.01; β Sample 1 = .23; β Sample 2 = .35) and negatively related to threat (B = -.13, p <.01; β Sample 1 = -.17; β Sample 2 = -.23). Moreover, in line with our expectation, an indirect effect was found between hardiness and challenge (B = .15, p <.01; β Sample 1 = .07; β Sample 2 = .11), and between hardiness and threat (B = -.10, p <.01; β Sample 1 = -.05; β Sample 2 = -.07). These results

confirmed that coping self-efficacy mediates between hardiness and appraisal.

Hardiness, coping style and coping behavior

Goodness of fit. The disturbance terms between task-focused and emotion-focused coping style were allowed to correlate, because it was not expected that all the variance would be explained by hardiness. The model provided good fit for Sample 1: χ^2 (5) = 8.34, GFI = .97, CFI = .91, RMSEA = .08, and SRMR = .07, and Sample 2: χ^2 (5) = 4.3, GFI = .98, CFI = 1.00, RMSEA = .00, and SRMR = .04. Next, multigroup analysis was conducted to assess whether the model was equal for both samples. The outcomes of the multigroup analysis showed good fit for respectively the unconstrained model: χ^2 (10) = 12.68, GFI = .98, CFI = .97, RMSEA = .04, and SRMR = .06; the structural weights model (with regression weights constrained to be equal): χ^2 (14) = 18.03, GFI = .97, CFI = .95, RMSEA = .04, and SRMR = .08; and the structural covariances model (with covariances constrained to be equal): χ^2 (15) = 18.49, GFI = .97, CFI = .96, RMSEA = .03, and SRMR = .08. In addition, the unconstrained model did not provide better model fit compared to the structural weights model or the structural covariances model. These results imply that the two samples did not differ in regression weights and covariances. Finally, the analysis showed that the samples do differ in residuals. This means that the unexplained variance differs per sample. From these results can be concluded that the causal structure of the proposed model is equivalent in both samples, providing a cross-validation of our model (Byrne, 2001).

Alternative model. Goodness of fit of a partial mediation model in which direct paths were added between hardiness and coping behavior was assessed. Although this model fitted the data well, a chi-square difference test did not show incremental fit over the proposed model. Moreover, the added paths did not show a significant R^2 increase in coping behavior. Therefore, the more parsimonious model was preferred.

Parameter estimates. Because the multigroup analysis showed equality of regression weights, parameter estimates of the multigroup model with equal regression weights are reported. Note that standardized regression weights differ per sample, because residuals differ per sample. Figure 2 shows a summary of results. As expected, hardiness was positively related to task-focused coping style (B = .40, p <.01; β Sample 1 = .40; β Sample 1 = .37) and negatively related to emotion-focused coping style (B = -.47, p <.01; β Sample 1 = -.33; β Sample 1 = -.32). As expected, emotion-focused coping

style was positively related to emotion-focused coping behavior (B = .24, p <.01; β Sample 1 = .16; β Sample 2 = .20) and task-focused coping style was positively related to task-focused coping behavior (B = .41, p <.01; β Sample 1 = .23; β Sample 2 = .33). To assess the expectations with regard to mediation, the bootstrap function in AMOS was used to calculate the significance of the indirect effect of hardiness on coping behavior (cf. Kline, 2005). In line with the expectations, an indirect effect was found between hardiness and task-focused coping behavior (B = .16, p <.01; β Sample 1 = .09; β Sample 2 = .12), and between hardiness and emotion-focused coping behavior (B = -.11, p <.01; β Sample 1 = -.05; β Sample 2 = -.06). These results confirmed that coping style mediates between hardiness and coping behavior.

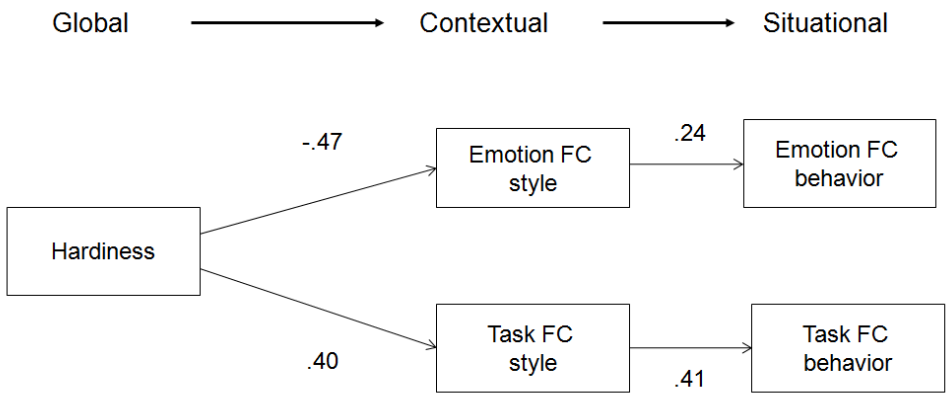

Figure 2. *Unstandardized estimates of multigroup analysis with structural weights constraints testing mediation between hardiness and coping behavior*
Note. FC= Focused Coping; For all estimates p < .01

Discussion

The purpose of the present study was to assess whether coping style and coping self-efficacy mediate between hardiness and responses to a stressful situation. We proposed that the effect of hardiness on the appraisal of and coping behavior in a stressful event was mediated by two domain-specific person characteristics, i.e., coping style and coping self-efficacy (cf. Vallerand, 2000). This expectation was investigated using a longitudinal design, in two independent military samples. Hardiness was measured at the beginning of basic military training, coping style and coping self-efficacy

were measured 15 to 17 weeks later, and again 2 weeks later appraisal and coping behavior were measured during a stressful military exercise.

First, the findings confirm that coping style mediated between hardiness and coping behavior. More specifically, hardy people had a more effective coping style (i.e., more task-focused and less emotion-focused), and consequently showed more effective coping behavior during a specific stressful situation. This is in line with hardiness theory and earlier findings; because hardy people tend to approach stressful situations more actively, they use more transformational ways of coping (Maddi, 2002; Kobasa, 1979). The findings also indicate that the direct effect of hardiness on coping behavior does not have additional predictive value when coping style is taken into account. In other words, from the present study it can be concluded that hardiness affects coping behavior in a specific situation, because coping style mediates between hardiness and coping behavior. Second, the results confirmed the expectation that coping self-efficacy mediates between hardiness and appraisal. More specifically, hardy people were more confident about their ability to cope with a stressful situation and consequently appraised the situation as more challenging and less threatening. Moreover, analyses indicated that hardiness did not predict appraisal over and above the effect of coping self-efficacy. This is in line with hardiness theory and research, which claims that hardy people appraise situations as more challenging and less threatening, because they are more confident in their ability to cope with stressful situations (e.g., Westman, 1990).

The findings imply that the effect of hardiness on the response to a stressful situation is mediated by domain-specific person characteristics. These results support Vallerand's (2000) distinction between global, contextual, and situational level variables. In this view, hardiness is a broad disposition (Maddi, 2002) that influences contextual level person characteristics, such as coping style and coping self-efficacy, which in turn influence the situational response. Including more contextual level person characteristics in future studies that investigate the influence of hardiness can reveal how hardiness sorts its effects, and thereby enable researchers to explain why hardiness sometimes has equivocal results when predicting health or performance outcomes (cf. Vallerand, 2000).

The study also provides practical implications. The results indicate that hardiness can be used as a selection criterion for selecting professionals that have to perform in stressful conditions. In addition, the findings suggest that hardiness produces its effect through more domain-specific person characteristics such as coping style and coping-self efficacy. These person

characteristics are often trained in stress management training programs, such as Stress Inoculation Training (Meichenbaum, 1985). This implies that the effects of hardiness can also be trained by enhancing coping style and coping self-efficacy.

The results of the present study underline the importance of studying mediating processes that explain how a hardy orientation towards life influences the appraisal and coping behavior during a specific stressful situation. However, this study has some limitations. First, samples sizes were relatively small. Second, because the present results were found in a military, young, and mainly male sample, they should be generalized to other populations with caution. However, the use of a longitudinal design and two independent samples, does allow us to draw robust conclusion about the effects found. The findings confirm the importance of hardiness as predictor of responses during a stressful situation, and thereby underline the necessity for the advancement of hardiness research in order to have a better understanding of its effects and the mechanisms underlying it.

Chapter 6

Enhancing coping style during military training: The role of metacognitive awareness, goal orientation and perceived error culture[11]

Abstract

Coping style is an important predictor of the ability of professionals to deal with stressful situations. Research into the development of coping style is important for organizations, because it provides insight in how to foster an effective coping style in professionals. Person and organization characteristics known to affect learning in organizations were expected to influence coping style development during military training. The present study investigated the influence of goal orientation and perceived error culture on coping style development with metacognitive awareness as a mediator. The findings showed that participants (N = 235) with a strong learning goal orientation developed a more effective coping style because they had stronger metacognitive awareness, whereas performance goal orientation was not related to metacognitive awareness nor to coping style development. The dimensions of perceived error culture were related to coping style development, either directly or mediated by metacognitive awareness. The findings indicate that a strong individual learning goal orientation and a strong organizational error management culture lead to the development of an effective coping style in professionals. The present study extends the literature of coping style development from the domain of development psychology and organizational psychology, and renders practical implications for organizations to enhance professionals' coping style.

Introduction

Over the last decades, the concept of coping has become increasingly important. Coping refers to the cognitive and behavioral efforts people exert

[11] This chapter is based on Delahaij, Gaillard, & Van Dam (2009c)

to ameliorate negative consequences of stressful events (Lazarus & Folkman, 1984). A distinction is made between coping strategies aimed at managing the source of the stress (i.e., active coping, task-focused coping), and those aimed at managing the distress (i.e., emotion-focused coping) or distancing oneself from the situation (i.e., avoidance-oriented coping) (Endler & Speer, 1990, 1994). In task performance situations, task-focused coping is considered to be more effective. Extensive evidence indicates that task-focused coping can reduce the negative effects of stressful circumstances on health and performance (for a review, see Folkman & Moskowitz, 2004). Individual differences in coping can be explained by preferences that people have for certain ways of coping, i.e., coping style (Lazarus & Folkman, 1984). As people's habitual way of coping (Carver & Scheier, 1994), coping style has been shown to affect coping in a range of specific situations (Ptacek, Pierce, & Thompson, 2006; Carver & Scheier, 1994; Endler & Parker, 1994).

Originally, coping style was considered to be a stable personality characteristic. Recently, more attention has been given to the developmental aspects of coping style (Skinner & Zimmer-Gembeck, 2007; Skinner & Edge, 1998; Aldwin, 2007). These studies have generally focused on the development of coping style during childhood and adolescence (for reviews see Skinner & Zimmer-Gembeck, 2007; Compas, Connor-Smith, Saltzman, Harding Thomsen, & Wadsworth, 2001). Some scholars have also focused on the development of coping style as a result of a life-changing event, such as contracting a possible fatal illness (e.g., Reeves, Mirriam, Courtenay, 1999).

In organizational psychology, the importance of coping style has also been acknowledged, and many studies have investigated the relevance of coping for professionals' health and performance (e.g., Luria & Torjman, 2008; Ippolito, Adler, Thomas, Litz, & Hölzl, 2000; Sears, Urizar, & Evans, 2000). However, the developmental aspects of coping style have not received much attention in organizational psychology. Organizations can influence the development of an effective coping style in two ways. First, organizations such as the military, police-force and those in aviation, can train their personnel to cope more effectively with stressful situations by using stress management training programs, and therefore affect the development of an effective coping style. A second way in which organizations can affect coping style development is through socialization processes. Socialization into an organization is associated with a process in which employees learn the values, abilities, expected behaviors, and social knowledge they need to perform in the organization (Louis, 1980).

Likewise, socialization processes also affect the way employees perceive stressors and the kind of coping that is considered appropriate (e.g., Dolan & Ender, 2008; Le Scanff & Taugis (2002). For example Le Scanff and Taugis (2002) identified an organizational norm within the police force that made employees refrain from showing or admitting fear or anxiety (e.g., emotion-focused coping), because this was perceived as weak. Thus, socialization processes can affect coping style development in professionals.

In the present study, coping style development was studied within a military organization. For military organizations it is important that their personnel can cope with stressful situations, because it is very likely that they will have to perform their job in a stressful environment. Therefore, military training aims to enhance effective coping: recruits are trained to take an active approach when confronted with a problem, and not disengage from the situation (e.g., Davis, 2006). By confronting the recruits with their coping responses in stressful situations and stimulating an appropriate coping response, recruits are trained to adopt a more active task-focused coping style (Driskell, Salas & Johnston, 2006). The goal of the present study was to investigate whether person characteristics (i.e., metacognitive awareness and goal orientation) and organization characteristics (i.e., perceived error culture) which are assumed to influence learning within organizations, affect the development of coping style during military training.

Development of coping style during military training

According to Skinner and Zimmer-Gembeck (2007), the development of coping style is shaped by experiences with stressful situations and through social relationships. Individual differences in the development of coping depend on psychological characteristics, such as temperament, but also depend on the social environment. During childhood and adolescence, the social environment (i.e., parents, peers, and teachers) is an influential force in shaping coping style. Skinner and Zimmer-Gembeck (2007) call this the socialization of coping, because the social environment shapes coping by influencing the stressful situations children and adolescents are confronted with, the way they appraise and respond to a stressful situation.

Entering a military organization also involves an intensive socialization process in which recruits learn the values, abilities, expected behaviors, and social knowledge they need to perform in the military organization (Soeters, 2000). Coping style development is part of this socialization process. An important goal of basic military training is to enhance effective coping. During basic military training, recruits are

regularly confronted with stressful situations in order to learn to cope more effectively. Recruits are taught to cope in a more task-focused way in order to stay focused on their assignment or task in stressful situations, and refrain from using emotion-focused or avoidance-oriented ways of coping that disengage them from the assignment and task (Driskell et al., 2006). Only a few studies have investigated the development of coping style during basic military training. Davis (2006) found that task-focused coping style increased, and avoidance-oriented coping style decreased during U.S. Army basic combat training. For the present study, it is expected that basic military training will similarly affect coping style development.

> *Hypothesis 1: During basic military training coping style becomes more task-focused and less emotion-focused and avoidance-oriented*

As suggested by the literature on coping style development, it is expected that this development is also affected by psychological characteristics of the individual (i.e., metacognitive awareness and goal orientation), and characteristics of the social environment (i.e., perceived error culture). Next, these expectations will be discussed in more detail.

Metacognitive awareness

In the past 20 years, metacognition has become an important predictor of learning performance in the educational domain (Flavell, 1979). Schraw and Dennison (1994, p. 460) define metacognition as 'the ability to reflect upon, understand, and control one's learning'. Learners that are more 'metacognitive aware' are more strategic and perform better, because they have insight in their own learning strategies and effectiveness, and plan and monitor their learning to improve performance (Schraw & Dennison, 1994). Studies in academic performance and physical education have shown that people with strong metacognitive awareness develop more effective learning strategies and perform better (Theodosiou & Papaionnou, 2006; Schraw & Dennison, 1994; Meloth, 1990).

To our knowledge, the concept of metacognitive awareness has not yet been applied to stress and coping research. However, the importance of awareness about one's stress reactions and coping strategies, for regulating coping behavior has been acknowledged since the development of cognitive-behavioral therapy for anxiety disorders (e.g., Meichenbaum, 1985). We have defined the concept of metacognitive awareness about stress and coping as a process which encompasses *insight in one's emotional and physiological reactions and coping behaviors during*

stressful situations, and the conscious regulation of these reactions and behaviors. People who have a strong metacognitive awareness are expected to develop an effective coping style, because they are able to learn more about the effectiveness of different coping strategies from their experiences during stressful situations (either during training or work). Thus, in the military organization, recruits that are metacognitively aware are better able to adjust their coping style in response to the training environment. Because this training environment aims to enhance task-focused coping and decrease emotion-focused and avoidance-oriented coping, it is expected that recruits with strong metacognitive awareness will develop accordingly.

> *Hypothesis 2: Metacognitive awareness is positively related to the development of task-focused coping style, and negatively related to the development of emotion-focused coping style and avoidance-oriented coping style*

Goal orientation

Goal orientation is considered to be an important predictor of learning, besides ability. A distinction is made between learning and performance goal orientation (Dweck, 1986). The first is characterized by a striving to enhance one's competence and to learn something new. The second is characterized by a striving to obtain positive and prevent negative judgments of others about one's competence. Dispositional goal orientation refers to one's goal preference in achievement situations and is assumed to be a stable person characteristic (Ames & Archer, 1988). In educational psychology and organizational psychology literature, goal orientation has been shown to influence learning and performance because it determines how people interpret and respond to achievement situations (for a review see Payne, Youngcourt, & Beaubien, 2007).

Dispositional goal orientation affects the way people appraise adverse performance feedback when trying to attain a goal, because it affects how people respond to adversity (Deci & Ryan, 2000; Ames & Arcer, 1988). People with a strong learning goal orientation perceive adverse performance feedback as a possibility for growth and mastery. As a result, they use more deep-processing learning strategies that enable them to master the task, and are more persistent when confronted with adversity. People with strong performance goal orientation perceive adverse performance feedback as an indication of their lack of ability. As a result, they use more surface approach learning strategies when trying to master the

task, and are more avoidance-oriented and less persistent when confronted with adversity (Moneta & Spada, 2009; Ames & Arcer, 1988).

Dispositional goal orientation may elicit similar processes when recruits attempt to improve coping. During basic military training, recruits will be confronted with performance decrements due to stress (e.g., Harris, Hancock, & Harris, 2005). Recruits with a strong learning goal orientation will perceive these performance decrements as challenging and a possibility for growth. As a result, they will engage in more deep-processing learning strategies and be more metacognitively aware because they reflect more on their stress and coping responses and think of strategies to improve coping. Recruits with a strong performance goal orientation will perceive these performance decrements as indicator of their lack of ability to perform under stress. As a result, they will not be motivated to engage in deep-processing learning strategies, and be less metacognitively aware. Thus deep-processing learning strategies are related to metacognitive awareness (e.g., Ford, Smith, Weissbein, Gully, & Salas, 1998), and subsequently to the development of more effective coping styles (more task-focused, less emotion-focused or avoidance-oriented). In other words, recruits with a strong learning goal orientation will be more metacognitively aware about stress and coping and therefore develop a more effective coping style. Recruits with a strong performance goal orientation will be less metacognitively aware, and therefore develop a less effective coping style.

Several studies have investigated the relationship between goal orientation and metacognition. Studies were conducted mainly with students: studying for exams (e.g., Bartels & Magun-Jackson, 2009), in physical education (e.g., Theodosiou & Papaionnou, 2006) or as participants in experiments (e.g., Ford et al., 1998). For example, Ford et al. (1998) found that students with a learning goal orientation showed more metacognitive activity when trying to master a complex decision-making task. Studies that investigated the relationship between goal orientation and coping in general find that learning goal orientation is associated with task-focused coping, whereas performance goal orientation is associated with emotion-focused or avoidance-oriented coping (Moneta & Spada, 2009; Brdar, Rijavec, & Loncaric, 2006; Pensgaard & Roberts, 2003; Kaplan & Midgley, 1999; Ntoumanis, Biddle, & Haddock, 1999). For example, Moneta and Spada (2009) found that students with a strong learning goal orientation who were preparing for an exam used more task-focused coping and less avoidance-oriented coping, whereas students with a strong performance goal orientation used more avoidance-oriented coping. To our

knowledge, no studies have investigated the mediating role of metacognitive awareness between goal orientation and coping style.

Hypothesis 3: Metacognitive awareness mediates the effect of learning goal orientation on the development of an effective coping style in that (a) learning goal orientation positively affects metacognitive awareness, and (b) metacognitive awareness leads to a more effective coping style.

Hypothesis 4: Metacognitive awareness mediates the effect of performance goal orientation on the development of an effective coping style in that (a) performance goal orientation negatively affects metacognitive awareness, and (b) metacognitive awareness leads to a more effective coping style.

Perceived error culture

Organizations can influence the way employees learn from stressful situations that hamper effective performance, because they influence the way employees learn from failure. Often employees do not learn from failure, because within organizations technological and social barriers inhibit employees from learning (Cannon & Edmondson, 2005). One aspect of the social environment that affects learning from failure is error culture. Error culture refers to the shared beliefs, attitudes and behavioral styles that determine how people cope with errors in an organization (Van Dyck, Frese, Baer & Sonnentag, 2005). Like goal orientation, error culture affects learning, because it affects the way people perceive and deal with error situations (Van Dyck, 2000). A distinction can be made between error prevention culture, and error management culture. Whereas error prevention focuses on avoiding errors and their negative consequences, error management focuses on dealing with the consequences of error and learning from error. Hence, the latter stimulates learning from error more than the former (Van Dyck et al., 2005). Because error situations are often stressful and people are more likely to make errors in stressful situations, error culture is expected to affect the way recruits learn from stressful situations and thus how they develop their coping style.

Error management culture is considered to have different dimensions (Van Dyck, 2000), i.e., mastery, awareness, and social orientation. A mastery orientation, like learning goal orientation, focuses people in an organization on possible growth and mastery after an error has occurred. As a result, errors are analyzed thoroughly, learning from errors is considered

important, and people are focused on reducing possible negative consequences of errors. Awareness refers to the anticipation of errors and risks, and the acceptance of possible errors. Social orientation implies that people in an organization talk more openly about the errors they make and what they can learn from it and help each other when dealing with the consequences of errors. These three dimensions of error management culture all enhance the learning from errors (Van Dyck et al., 2005). On the other hand, error aversion culture consists of a refusal to accept the possible occurrence of errors. As a result, people in an organization tend to feel strain when they make an error and try to cover up errors. Therefore, error aversion culture does not stimulate learning from errors like error management culture does (Van Dyck et al., 2005; Van Dyck, 2000).

Since perceived error culture affects learning, it is likely that it also affects metacognitive awareness and indirectly contributes to coping style development. When recruits are learning to cope with stressful situations, they are constantly confronted with possible errors due to stress. The way the organization approaches errors will influence their learning process. When the organization has an error management culture, recruits will be motivated to reflect on their stress and coping responses and learn from it. Consequently, they will be more metacognitively aware and therefore develop a more effective coping style. By contrast, when the organization has an error aversion culture, recruits are less motivated to learn from errors during stressful situations. As a result, they will be less metacognitively aware and will not develop an effective coping style. This view is in line with Keith and Frese (2005) who showed that trainees receiving an error management training were better able to apply learned skills and knowledge in a new situation (i.e., transfer of training) compared to trainees receiving an error aversion training. In addition, this effect was mediated by metacognitive activity (comparable to regulation in metacognitive awareness). To our knowledge, the relationship between error culture and metacognitive awareness has not been investigated before.

> *Hypothesis 5: Metacognitive awareness mediates the effect of perceived error management culture on the development of an effective coping style in that (a) perceived error management culture positively affects metacognitive awareness, and (b) metacognitive awareness leads to a more effective coping style.*

Hypothesis 6: Metacognitive awareness mediates the effect of perceived error aversion culture on the development of an effective coping style in that (a) perceived error aversion culture negatively affects metacognitive awareness, and (b) metacognitive awareness leads to a more effective coping style.

Method

Participants

To have a representative sample of personnel of the Dutch defense organization, participants from different parts of the organization were included. Participants for the present study were officer cadets of the Netherlands Defence Academy enrolled in 18 weeks of basic military training, infantry recruits enrolled in 22 weeks of basic military training of the Netherlands Air Mobile Brigade, and Marines recruits enrolled in 30 weeks of basic training. Initially, 230 officer cadets, 123 infantry recruits and 170 Marine recruits participated in the study. However, during basic military training there is much attrition. In addition, not all participants were able to participate in all the measurements. Therefore, the final sample consisted of 235 participants, with 116 officer cadets (20 women, 96 men; mean age 20.4 years), 65 infantry recruits (all men; mean age 19.3 years), and 54 Marine recruits (all men; mean age 18.8 years).

Procedure

During the first week of training, participants were informed about the goals of the study. They were also told that participation was voluntary, and that consent was implied by completion and return of the survey. Participants were given a research number. Only the researchers had access to the name connected to the number. During this first week, goal orientation and coping style were measured (T1). Perceived error culture was not measured at this moment, because the participants would not have been in the organization long enough to make an accurate assessment of error culture. In the middle of the training period, perceived error culture was measured (T2). At the end of the training period metacognitive awareness was measured and coping style was measured again (T3).

Measures

Unless otherwise indicated, a 5-point Likert scale was used ranging from 1 (*not at all*) to 5 (*very much*).

Goal orientation. Performance and learning goal orientation were measured using the goal orientation scales developed by Button, Mathieu, and Zajac (1996). Both scales consist of 8 items. Examples of items are respectively: 'The things I enjoy the most are things I do best', and 'I prefer to work on tasks that force me to learn new things'. The internal consistency reliability estimate (Cronbach's Alpha) was .75 for learning goal orientation, and .61 for performance goal orientation.

Perceived error culture. The Error Culture Questionnaire (ECQ; Van Dyck, 2000) was used to measure error management and aversion culture. We changed the wording of some items to make them appropriate for military training, and some items were removed because they were not appropriate for a training situation. The error management scale consisted of the factors mastery (13 items), awareness (11 items), and social orientation (9 items). Example items are respectively, 'Our errors point us to what we can improve', and 'Errors are accepted in this training program', and 'When people make an error they can ask others for advice on how to continue'. Error aversion culture was measured with one scale (9 items). An example item is 'In this training program, people get upset when an error occurs'. The internal reliability was .71 for mastery, .80 for awareness, .74 for social orientation, and .66 for error aversion.

Metacognitive awareness. We developed a metacognitive awareness about stress and coping (MASC) scale based on the work of Schraw and Dennison (1994), who constructed a metacognitive awareness scale for the educational domain. The MASC consist of 26 items, and measures insight in one's emotional and physiological reactions to stress, insight in one's coping behavior during a stressful situation, and monitoring and evaluation of reactions, coping behavior and subsequent performance during and after a stressful situation. Example items are 'I know how my body reacts in stressful situations'. 'I know which ways to cope with stress work for me', 'During a stressful situation I try to be aware of my emotional reactions', and 'After a stressful exercise I think about how I reacted'. We tested reliability and validity in a pilot study at the Netherlands Defense Academy (n = 89). In the present study, the internal reliability was .88.

Coping style. Coping style was measured with the Coping Inventory for Stressful Situations (CISS) (Endler & Parker, 1994; Ridder & Heck, 1999), which consists of the scales task-focused coping style (16 items), emotion-focused coping style (16 items) and avoidance-oriented coping style (16). Examples of items are respectively: 'Work to understand the situation', 'Blame myself for being too emotional about the situation' and 'Watch TV'.

Internal reliabilities at T1 were .84 for task-focused coping style, .87 for emotion-focused coping style, and .88 for avoidance-oriented coping style. Reliabilities at T3 were .84 for task-focused coping style, .88 for emotion-focused coping style, and .89 for avoidance-oriented coping style.

Analyses

To assess the development of coping style during military training, paired t-tests were conducted. In addition, to assess whether the development of coping style was predicted by metacognitive awareness, goal orientation and perceived error culture, autoregression was used (Johnson, 2005). With autoregression the residual scores between two measurements in time are analyzed, by regressing the score later in time on the scores earlier in time. In the present study, coping style on T3 was regressed on coping style at T1. Structural equation modeling was used to perform the analysis, because it provides a stringent test of the hypothesized relationships and allows us to test mediation within the context of the model (Kline, 2005). Three separate analyses were conducted for the development of task-focused, emotion-focused and avoidance-oriented coping style.

Results

Development of coping style

Table 1 presents means, standard deviations and the correlations between the variables. In line with Hypothesis 1, task-focused coping style increased during basic military training ($t = 2.94$, $p < .05$) and emotion-focused coping style decreased during basic military training ($t = -2.10$, $p < .05$). Contrary to the hypothesis, avoidance-oriented coping style on average did not change during basic military training.

Goodness of fit

A model was tested in which metacognitive awareness fully mediated between error culture (EC) and goal orientation (GO) on the one hand, and task-focused, emotion-focused or avoidance-oriented coping style on T3 on the other. Thus, no direct paths were drawn between GO, EC and coping style at T3.

Task–focused coping style. Model fit was equivocal: χ^2 (7) = 29.21, GFI = .97, CFI = .96, RMSEA = .12, and SRMR = .04. RMSEA indicated insufficient fit. The modification indices implied that direct paths should be added between mastery EC and social orientation EC and task-focused

coping style on T3. The extended model provided good model fit: χ^2 (5) = 9.97, GFI = .99, CFI = .99, RMSEA = .06, and SRMR = .02.

Emotion-focused coping style. Model fit was equivocal: χ^2 (7) = 32.14, GFI = .97, CFI = .95, RMSEA = .12, and SRMR = .04. Especially RMSEA indicated insufficient fit. The modification indices implied direct paths should be added between mastery EC, awareness EC, aversion EC, and emotion-focused coping style on T3. The extended model provided good model fit: χ^2 (4) = 5.96, GFI = .99, CFI = 1.00, RMSEA = .05, and SRMR = .01.

Avoidance-oriented coping style. Model fit was sufficient: χ^2 (7) = 16.38, GFI = .98, CFI = .98, RMSEA = .08, and SRMR = .03. The modification indices however implied that the model fit could be improved by adding direct paths between both performance GO and aversion EC with avoidance-oriented coping style on T3. The extended model provided good model fit: χ^2 (5) = 4.14, GFI = .99, CFI = 1.00, RMSEA = .00, and SRMR = .01.

Parameter estimates

The standardized coefficients of the analyses on task-focused, emotion-focused and avoidance-oriented coping style are presented in Figures 1, 2, and 3 respectively. Task-focused coping style at T1 and T3 were positively related (β = .32, p < .01). Emotion-focused coping style at T1 and T3 were positively related (β = .45, p < .01). Avoidance-oriented coping style at T1 and T3 were positively related (β = .59, p < .01).

In line with Hypothesis 2, metacognitive awareness was positively related to task-focused coping style on T3 (β = .30, p < .01), negatively related to emotion-focused coping style on T3 (β = -.23, p < .01) and negatively related to avoidance-oriented coping style on T3 (β = -.11, p < .05), when controlling for initial levels of coping style.

In line with Hypothesis 3, learning GO was positively related to metacognitive awareness. To test whether metacognitive awareness mediated between learning GO and the development of coping style, the significance of the indirect effect was assessed using bootstrapping in AMOS (cf. Kline, 2005). As expected, the indirect effect was significant between learning GO and task-focused coping style on T3 (β = .07, p < .01), emotion-focused coping style on T3 (β = -.06, p < .01), and avoidance-oriented coping style on T3 (β = -.03, p < .05). Contrary to Hypothesis 4, performance GO was not related to metacognitive awareness.

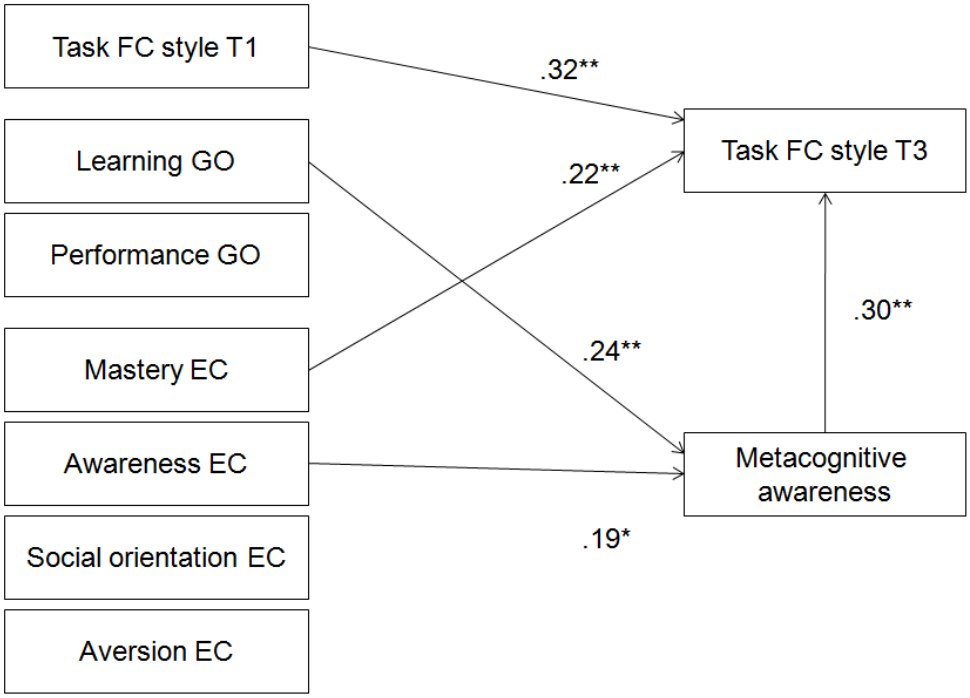

Figure 1. *Path model with significant paths with task-focused coping style at T3 as dependent variable.*
*Note. Only paths with significance levels of p < .05 are depicted. FC = Focused Coping, GO = Goal Orientation, EC = Error Culture, * p < .05, ** p< .01*

As Hypothesis 5 predicted, awareness EC was positively related to metacognitive awareness. Moreover, the bootstrapping analyses showed that the indirect relationships of awareness EC with task-focused coping style on T3 (β = .04, p < .05) and emotion-focused coping style on T3 (β = -.04, p < .05) were significant. The indirect effect between awareness EC and avoidance-oriented coping style on T3 was marginally significant (β = -.02, p =.07). The other dimensions of error management EC were not related to metacognitive awareness. Therefore, Hypothesis 5 was only partially supported. Contrary to Hypothesis 6, aversion EC was not related to metacognitive awareness.

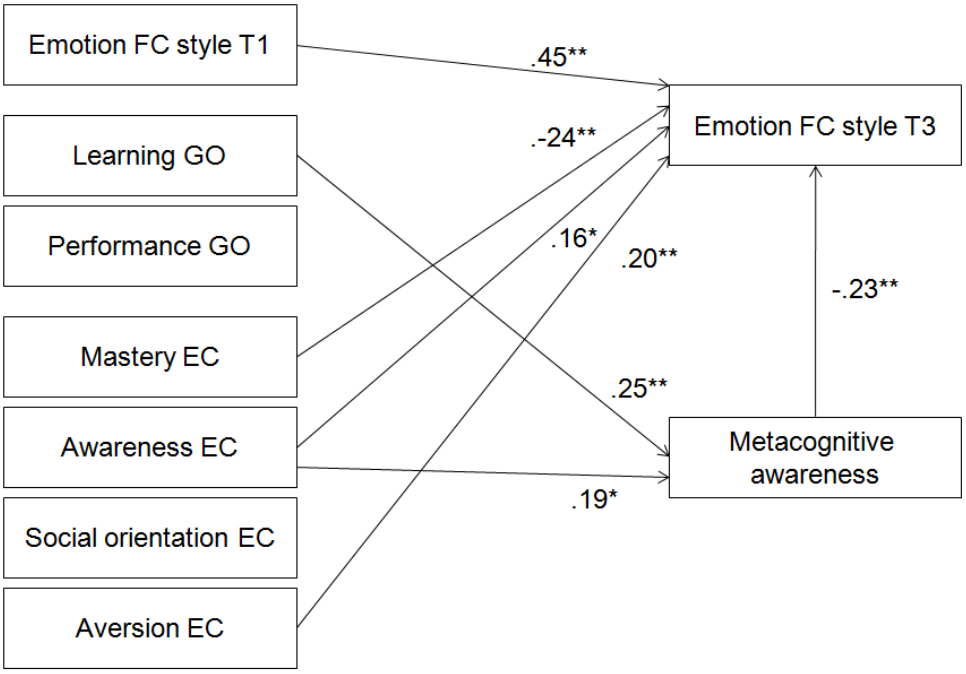

Figure 2. *Path model with significant paths with emotion-focused coping style at T3 as dependent variable*
*Note. Only paths with significance levels of p < .05 are depicted. FC = Focused Coping, GO = Goal Orientation, EC = Error Culture, * p < .05, ** p< .01*

Although the predicted indirect effect of error culture on coping style development was only found for the awareness dimension, the findings did indicate that relationships between error culture and coping style at T3 existed. The results showed that mastery EC had a direct positive effect on task-focused coping style on T3 (β = .22, p < .01), and a direct negative effect on emotion-focused coping style at T3 (β = -.24, p < .01). Also, awareness EC had a direct positive effect on emotion focused coping style at T3 (β = .16, p < .05). Moreover, aversion EC had a direct positive effect on emotion-focused coping style at T3 (β = .20, p < .01), and on avoidance-oriented coping style at T3 (β = .14, p < .01).

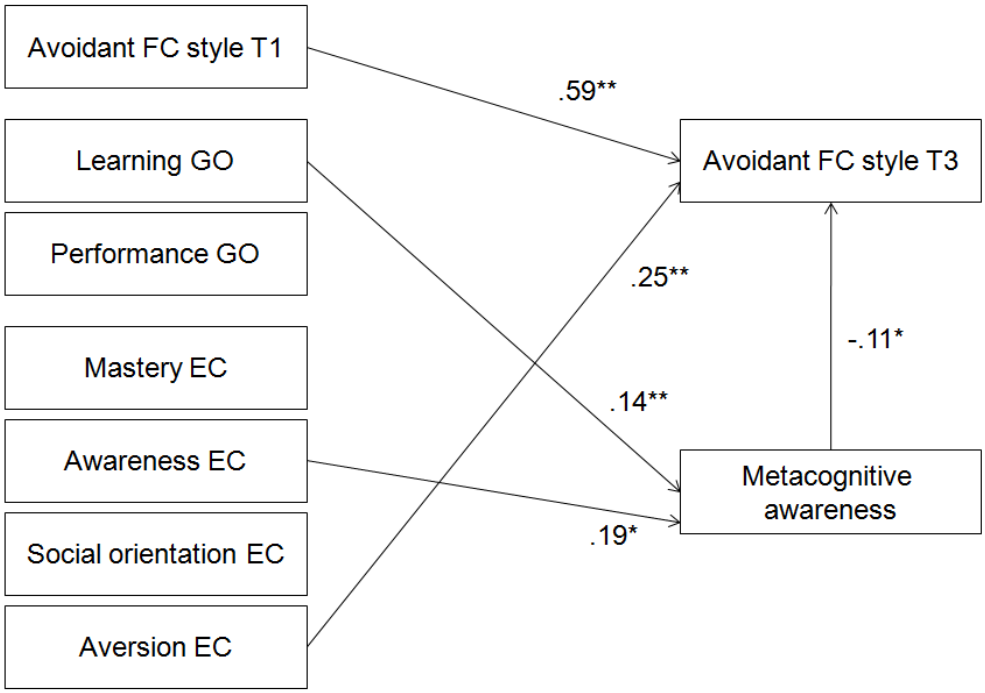

Figure 3. *Path model with significant paths with avoidance-oriented coping style at T3 as dependent variable.*
*Note. Only paths with significance levels of p < .05 are depicted. FC = Focused Coping, GO = Goal Orientation, EC = Error Culture, * p < .05, ** p< .01*

Discussion

The aim of the present study was to extend research into coping style development from the domain of developmental psychology to organizational psychology. Two individual psychological characteristics (i.e., metacognitive awareness and goal orientation) and one organization characteristic (i.e., perceived error culture), which were considered important for learning in organizations, were studied as antecedents of coping style development during basic military training.

In basic military training recruits are trained to use more active and task-focused ways of coping, and to refrain from emotion-focused and avoidance-oriented ways of coping when confronted with stressful

situations (Driskell et al., 2006). Therefore, task-focused coping style was expected to increase, whereas emotion-focused and avoidance-oriented coping style were expected to decrease during basic military training. Paired t-tests partly confirmed this hypothesis: task-focused coping style increased and emotion-focused coping style decreased from the start to the end of basic training. Avoidance-oriented coping style did not show significant change. A possible explanation for this lack of result can be found in the wording of the items. Avoidance-oriented coping style was measured with items such as 'visit a friend', 'see a movie', 'Watch TV', and 'take time off and get away from the situation'. Within basic military training, cadets and recruits are restricted in some of these activities when they are in garrison. For future studies, an avoidance-oriented coping style questionnaire with items specifically appropriate for military training should be developed.

The present study included the concept of metacognitive awareness about stress and coping, which was expected to affect the development of coping style. People who were more metacognitively aware were expected to develop a more effective coping style, because they have more insight in the effectiveness of their own coping responses and try to regulate future coping to be more effective in stressful situations. In line with this hypothesis, metacognitive awareness was positively related to task-focused coping style and negatively related to both emotion-focused coping style and avoidance-oriented coping style at the end of military training, when controlling for coping style at the start of military training. In other words, participants who were more metacognitively aware developed a more effective coping style during military training.

Furthermore, it was expected that goal orientation would affect the development of coping style through its effect on metacognitive awareness. In line with this hypothesis, participants with a strong learning goal orientation at the start of basic military training had a strong metacognitive awareness. Moreover, metacognitive awareness mediated between learning goal orientation and coping style at the end of training. More specifically, participants with a strong learning goal orientation, were more metacognitively aware, and therefore developed a coping style that was more task-focused, less emotion-focused, and less avoidance-oriented. These results confirm findings of other studies showing that learning goal orientation affects coping style (e.g., Kaplan & Midgley, 1999). Moreover, it extends these findings. Until now, no studies have investigated the relevance of learning goal orientation for the development of coping style. The present study showed that learning goal orientation influences the development of coping style. Moreover, the findings indicate that this effect

works through metacognitive awareness. The importance of metacognitive awareness as mediator between learning goal orientation and coping style development is in line with self-determination theory (Ames & Archer, 1988; Dweck, 1986), which states that people with a strong learning goal orientation use more deep-processing strategies to learn, and therefore learn and perform better.

Contrary to our expectations, performance goal orientation did not affect metacognitive awareness or coping style. This result is surprising, because other scholars have found that performance goal orientation is related to avoidance-oriented coping (e.g., Moneta & Spada, 2009; Ntoumis et al., 1999) and emotion-focused coping (e.g., Kaplan & Midgley, 1999; Ntoumis et al., 1999). A possible explanation is that performance goal orientation is not a critical factor in the military organization. In this organization, team performance is often more important than individual performance, because most missions are only performed by teams. When people with a strong performance goal orientation are evaluated at team level instead of at the individual level, the processes that influence learning may not be as strong, because they do not feel that their individual ability is being assessed. Instead, they might attribute adverse performance feedback to a poorly performing team. Another possible explanation involves the way performance goal orientation was measured in the present study. Recently, scholars have advocated measuring two dimensions of performance goal orientation: performance-approach and performance-avoidance (see Payne et al., 2007). In the present study, this distinction was not made. This could have caused the low reliability of this scale and the lack of significant findings. Future studies should assess the relevance of goal orientation for coping in the military, using the distinction between performance-approach and performance-avoidance goal orientation.

Finally, perceived error culture was expected to affect metacognitive awareness and consequently the development of coping style. Dimensions (mastery, awareness and social orientation) of perceived error management culture were expected to be positively related to metacognitive awareness, and perceived error aversion culture was expected to be negatively related to metacognitive awareness. In line with this hypothesis, awareness error culture was positively related to metacognitive awareness. Moreover, metacognitive awareness mediated between awareness error culture on the one hand, and task-focused, emotion-focused and avoidance-oriented coping style at the end of basic military training on the other. The other dimensions of error management culture (mastery and social orientation) were positively correlated with metacognitive awareness, but did not predict

metacognitive awareness above and beyond learning goal orientation and awareness error culture. These findings imply that recruits who perceive their organization as having an awareness error culture, that is a culture that is accepting towards the possible occurrence of errors and that fosters anticipation of errors and risks, are more metacognitively aware and therefore develop a more effective coping style. These findings are in line with studies that have found that an error management culture facilitates learning (Van Dyck et al., 2005; Van Dyck, 2000).

The findings also revealed that error management culture was directly related to coping style development. First, perceived mastery error culture was positively related to the development of task-focused coping style and negatively to the development of emotion-focused coping style. Participants who perceived that the organization focused on possible growth and mastery after an error, and stimulated active learning from errors, tended to use more task-focused and less emotion-focused coping at the end of the training. This is in line with error culture theory, which supposes that an error management culture stimulates a proactive approach to error situations, which are also often stressful (Van Dyck, 2000). Second, the results showed that awareness error culture affected emotion-focused coping style at the end of training in two ways. Besides a negative effect through metacognitive awareness, awareness error culture directly affected emotion-focused coping style development in a positive way. This kind of mixed result is possible in path-analyses with more predictors, and is often an indication of a suppression effect (Smith, Ager, & Williams, 1992). In this study, perceived awareness error culture has a (non-significant) negative zero-order correlation with emotion-focused coping style on T3, but has a positive direct effect on that variable when other predictors are included. Suppression occurs because perceived awareness error culture is positively correlated with metacognitive awareness, whereas metacognitive awareness is negatively related to emotion-focused coping style on T3. Both the negative and the positive path between perceived awareness error culture and emotion-focused coping style on T3 are considered valid. Thus, these findings indicate that a strong awareness error culture negatively affects emotion-focused coping style development because it is positively related to metacognitive awareness, and also positively affects emotion-focused coping style development directly. A possible explanation for the latter result may be that people who are more aware of potential errors, experience more distress and therefore tend to use more emotion-focused coping.

Contrary to our expectations, error aversion culture was not related to metacognitive awareness. Instead, the results showed that error aversion

culture was directly related to emotion-focused and avoidance-oriented coping style on T3. Thus, perceived error aversion culture did not affect the development of coping style indirectly, through metacognitive awareness, but directly. Participants who believed that the organization does not accept errors, developed a more emotion-focused and avoidance-oriented coping style. This implies that in an organization with an error aversion culture, people are not inclined to deal actively with errors, but instead will try to ameliorate their distress due to error making (emotion-focused coping) and disengage themselves from potential error situations, such as stressful situations (avoidance-oriented coping). Thus, it seems employees have to believe their environment will react benevolently to errors, otherwise they will disengage from potential error situations. This is in line with Carmeli and Gittell (2009) and with Cannon and Edmondson (2005), who underline that psychological safety is a prerequisite for learning from failures at work.

Theoretical implications

The present study contributed to the literature by showing that coping style development is a relevant topic for organizational study. Whereas coping style is often considered a stable person characteristic, the present study indicates that professionals' coping style can develop. The aim of the present study was to investigate antecedents of the development of coping style. The results provide support for the relevance of self-determination theory (Dweck, 1986) for the coping domain. Especially, learning goal orientation appeared to be an important antecedent of coping style development. The present study showed that similarly to academic learning and physical education, (e.g. Theodosiou & Papaionnou, 2006), learning to cope is positively affected by a learning goal orientation, because people use more deep-processing learning strategies, such as metacognition.

In addition, perceived error culture was shown to relate to the development of coping style. Until now, error culture research has focused on different outcomes, such as organizational learning and performance (e.g., Van Dyck, 2005). Our findings indicate that error management culture can lead to a more task-focused and less emotion-focused and avoidance-oriented coping style, whereas error aversion culture leads to a more emotion-focused and avoidance-oriented coping style. In the coping literature, it is generally accepted that in task situations (e.g., trying to learn something from errors), task-focused coping is more effective than emotion-focused coping and avoidance-oriented coping (Folkman & Moskowitz, 2004). Thus, one of the mechanisms through which error management culture positively affects organizational learning and performance may stem

from the relationship between error management culture and coping style. However, these results should be interpreted with caution because the present study measured perceived error culture at the individual level. Future studies should investigate whether error culture on organizational level (by aggregating perceived error culture scores) sorts similar effects.

Practical implications

The present study has practical implication not only for the military, but also for other organizations in which professionals are regularly confronted with stressful situations. These organizations can benefit from employees with an effective coping style because it improves organizational effectiveness and employee health. The findings indicate that employees who reflect upon stressful situations they encounter during work, and who regulate future coping in order to cope more effectively with stress (i.e., who are more metacognitively aware), develop a more effective coping style. The findings showed that this deep-processing learning from stressful encounters is influenced by individual characteristics, such as learning goal orientation, and organization characteristics, such as error management culture. Thus, organizations can influence the development of effective coping style in three ways. First, by selecting employees who have a strong learning goal orientation. Second, by directly enhancing metacognitive awareness (for instance, through training), organizations can promote the development of effective coping style in their employees. Finally, the results suggest that by fostering an error management culture in organizations the development of an effective coping style can be stimulated.

Strengths and limitations

One of the study's strengths was using a longitudinal design in which the variables were measured at three different time points. Most studies that investigate coping style and the antecedents of coping style in the organizational domain are cross-sectional, and therefore cannot investigate antecedents of coping style development. However, the longitudinal approach also brings some limitations. First, the changes in coping style were limited. Avoidance-oriented coping style did not change significantly from the start to the end of military training. Second, because not all participants were able to attend all the measurements, the data set contained missing values.

Another limitation of the present study concerns the sample. The sample consisted of mainly young men because basic military training was investigated. Therefore, results should be generalized with caution. Future

studies should include more female participants and investigate other organizations besides the military organization in order to replicate and extend current findings.

Finally, error culture was assessed and analyzed at the individual level (i.e., perceived) and not at the organizational level. In other words, the effect of the variance between individuals in perceived error culture within the organization was assessed. To assess the influence of error culture across organizations, samples within multiple organizations should be investigated. However, the present findings do suggest that the perception of error culture is relevant for employees' coping style. By fostering an error management culture, organizations can contribute to the development of effective coping styles in professionals, thereby enhancing organizational learning and performance. Future studies should assess coping style development and its antecedents in other organizations and different professions.

Table 1. *Means, standard deviations, and intercorrelations of variables*

Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12
1 Task FC style T1	3.74	.40												
2 Task FC style T3	3.82	.38	.48**											
3 Emotion FC style T1	2.19	.54	-.29**	-.20**										
4 Emotion FC style T3	2.11	.53	-.18**	-.32**	.49**									
5 Avoidance-oriented FC style T1	2.68	.70	.02	-.07	.36**	.31**								
6 Avoidance-oriented FC style T3	2.68	.74	-.14*	-.11	.38**	.53**	.63**							
7 Learning GO T1	4.00	.40	.56**	.38**	-.19**	-.14**	.02	-.04						
8 Performance GO T1	3.37	.48	-.04	-.06	.32**	.14*	.03	.12	.00					
9 Metacognitive awareness T3	3.74	.38	.27**	.45**	-.06	-.27**	-.06	-.15*	.28**	.09				
10 Mastery EC T2	3.81	.35	.31**	.42**	.01	-.25**	-.02	-.08	.20**	.04	.26**			
11 Social Orientation EC T2	3.80	.40	.28**	.34**	.01	-.12	.07	.01	.17**	-.01	.21**	.69**		
12 Awareness EC T2	3.70	.50	.15*	.22**	-.05	-.11	-.13*	-.11	.02	.00	.24**	.53**	.37**	
13 Aversion EC T2	2.85	.46	-.15*	-.07	.29**	.33**	.20**	.29**	-.09	.24**	-.05	-.27**	-.28**	-.37**

*Note. FC = Focused Coping, GO = Goal Orientation, EC = Error Culture; * p < .05, ** p< .01*

Chapter 7

General Discussion

Chapter 1 started with the description of an incident in Iraq in 2004 in which a unit of the Dutch Defense Force was confronted with an ambush that cost one man his life, but could have taken more lives. The incident was a prototypical acute stress situation, because it was sudden, novel, intense, and of relatively short duration, disrupting goal-oriented behavior, and requiring a proximal response (Salas, Driskel & Hughes, 1996). The servicemen involved had to think and act quickly in order to control the situation, in spite of distracting emotional, physiological and cognitive responses due to stress (Gaillard, 2008). The aim of this dissertation was to examine the processes that determine how people react to and act in this kind of situation. More specifically, the goal was to investigate through which mechanisms person and organization characteristics affect coping and performance during an acute stress situation.

The conceptual model presented in Chapter 1 (see also Figure 1) guided the research for this dissertation. The model was based on theories from different research fields: human factors, personality psychology, I-O psychology and military psychology. The model distinguished variables on three levels of proximity to the outcome (i.e., performance under acute stress): global, contextual and situational (cf. Vallerand, 2000). The global level consists of broad dispositions that are assumed to be stable over time and across situations, i.e. personality characteristics such as hardiness and achievement motivation. These personality characteristics shape the contextual person characteristics at the second level, which are more domain-specific, i.e., coping style, coping self-efficacy and metacognitive awareness. These contextual person characteristics, in turn, affect the situational level, which consists of responses to a specific situation, i.e., coping under acute stress. Finally, organization characteristics, such as error culture, were included in the model, because they are assumed to affect the contextual person characteristics as well.

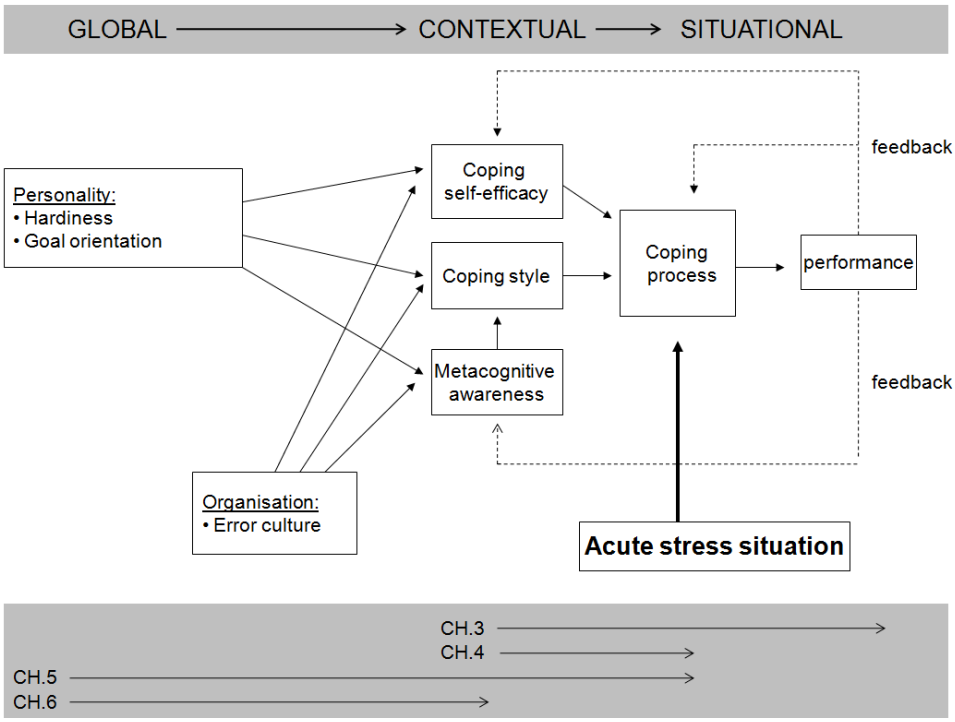

Figure 1. *Revised conceptual model and overview of the topics studied in the Chapters 3-6.*

Main findings

The main findings on the expectations posed in the conceptual model will be discussed, starting with the more proximal processes and ending with the more distal processes that affect performance under acute stress.

Performance under acute stress was expected to be determined by the coping process. The findings reported in Chapter 3 and 4 confirm the importance of coping for effective performance under acute stress. Adaptive coping during an acute stress situation encompasses all behavioral and cognitive reactions that enable an individual to effectively control the source of threat. As shown in Chapter 3, participants' (officer cadets and infantry recruits) self-reported coping behavior was related to the performance evaluation by military instructors in a stressful military self-exercise. This exercise was comparable to acute stress situations professionals may encounter in the field. In dynamic scenarios, the participants were confronted with realistic physical threat, which required quick responses to avoid personal harm and to meet the demands of their assignment.

Participants who reported using more task-focused and less emotion-focused coping behavior during the exercise were more positively evaluated. In Chapter 4, an additional analysis was done on an objective performance measurement that was used in the same exercise as in Chapter 3, but only for the officer cadets. The cadets (Sample 1) were given an additional assignment: they were instructed to remember 6 characters (letters and numbers) which were posted alongside the route. The results showed that task-focused coping behavior was positively related to the number of characters remembered, whereas emotion-focused coping behavior was marginally negatively related with the number of remembered characters. Thus, in an acute stress situation task-focused coping behavior (aimed at managing the source of distress) was effective, whereas emotion-focused coping behavior (aimed at lowering the distress) was not.

Second, it was expected that the coping process would be directly predicted by three contextual person characteristics that are relevant for coping with stress, i.e., coping style, coping self-efficacy and metacognitive awareness. In addition, it was expected that coping behavior mediates between the contextual person characteristics and performance. These expectations were tested in Chapters 3 and 4. The contextual person characteristics were measured two weeks before the stressful exercise during which coping behavior and performance were measured. In line with our expectation, participants with a more emotion-focused coping style showed more emotion-focused coping behavior and performed worse, and participants with a more task-focused coping style showed more task-focused coping behavior and performed better. In addition, the findings in Chapter 3 showed that coping self-efficacy was related to task-focused, but not to emotion-focused coping behavior. Participants who had a strong coping self-efficacy showed more task-focused coping behavior. Moreover, the results revealed that the relationship between coping style and coping self-efficacy on the one hand, and performance on the other, was mediated by coping behavior. Contrary to our expectations, metacognitive awareness about stress and coping was not related to coping behavior above and beyond coping style and coping self-efficacy.

These findings were extended in Chapter 4 by investigating the mediating role of appraisal between coping style and coping self-efficacy on the one hand, and coping behavior on the other. For this chapter, the data of all three samples were used. Appraisal and coping behavior of the Marine recruits was measured during an exercise in which they had to escape from a submerged mock helicopter (‘heliditch’). In line with our expectations, coping style directly affected coping behavior, whereas the relationship

between coping self-efficacy and coping behavior was mediated by appraisal. More specifically, participants with stronger coping self-efficacy appraised the exercise as less threatening and more challenging, and therefore showed more task-focused and less emotion-focused coping behavior. This demonstrates that people's habitual way of coping affects their coping behavior in an acute stress situation, and therefore their performance under acute stress. In addition, people's confidence in their ability to cope and perform under acute stress, affects their appraisal of the situation and subsequently their coping behavior.

Third, it was expected that the contextual person characteristics are related to personality and organization characteristics, and that they mediate between personality and organization characteristics and the coping process. The findings reported in Chapter 5 confirmed these expectations: the relationship between hardiness and appraisal was mediated by coping self-efficacy. More specifically, hardy participants were more confident in their ability to cope and to perform during a stressful military exercise, and therefore appraised the stressful exercise as more challenging and less threatening. In addition, the relationship between hardiness and coping behavior was mediated by coping style. More specifically, hardy participants had a coping style that was more task-focused and less emotion-focused, and therefore used more task-focused and less emotion-focused behavior during the exercise.

Fourth, it was expected that coping self-efficacy and coping style would develop during basic military training. In addition, we expected that this development would depend on personality and organization characteristics. Results in Chapter 4 revealed that, in line with our expectations, the officer cadets' and infantry recruits' task-focused coping style and coping self-efficacy increased, and that their emotion-focused coping style decreased during basic military training. The results were less strong for the Marine recruits: only emotion-focused coping style decreased significantly. This may have been caused by the small sample size. Overall, analyses on the whole group in Chapter 6 showed that on average task-focused coping style increased, whereas emotion-focused coping style decreased during basic military training. It should be noted, that the observed changes in coping style were relatively small. Avoidance-oriented coping style was also included, but no change was found during basic military training.

In Chapter 6 the hypothesis that the development of coping style during basic military training was affected by goal orientation and perceived error culture was tested. The results showed that participants with a strong

learning goal orientation had a more adaptive coping style (i.e., more task-focused, less emotion-focused and less avoidance-oriented) at the end of the training, when controlled for initial levels of coping style. Moreover, this relationship was mediated by participants' metacognitive awareness about stress and coping. This implies that participants with a stronger learning goal orientation, reflected more on their responses during and after stressful exercises and regulated their responses more, and therefore developed a more effective coping style. In contrast to the effects of learning goal orientation, performance goal orientation was not related to either coping style or metacognitive awareness.

In addition, perceived organizational error culture was related to participants' coping style at the end of the training, when controlled for initial levels of coping style. The dimensions error management culture and error aversion culture were related to the development of coping style. The dimension awareness of error management culture was positively related to metacognitive awareness, while metacognitive awareness in turn was related to a more effective coping style at the end of the training. In other words, participants with a strong learning goal orientation, and participants who perceived the military organization as fostering acceptance and anticipation of errors, were more metacognitively aware and subsequently developed a more effective coping style.

Findings in Chapter 6 indicated that perceived error culture also directly affected coping style. The dimension error aversion culture was related to higher levels of avoidance-oriented coping style at the end of the training. In addition, the results showed that perceived mastery error culture was related to higher levels of task-focused coping style and lower levels of emotion-focused coping style at the end of the training. Finally, the dimension awareness error culture had a direct positive effect on emotion-focused coping style. Thus, these findings suggest that error culture might be an important factor in coping style development of professionals.

Most of these findings are in line with the conceptual model presented in Chapter 2. Only the hypothesized effect of metacognitive awareness on the coping process was not found. In line with the findings, in Figure 1 a revised conceptual model is presented without a path from metacognitive awareness to the coping process.

Theoretical implications and directions for future research

The results of the studies reported in this dissertation contribute to theory about coping and performance under acute stress. The expectations tested in

this dissertation stem from theories (Gaillard, 2001; Lazarus & Folkman, 1984) about coping and performance under stress in general. In other words, the processes investigated in this dissertation could also be relevant for other kinds of stressful situations. It is likely that the effects reported in this dissertation also apply to enduring stress situations (e.g., longer period of too high workload). Future research could clarify this issue. Finally, it should be noted that the findings in this dissertation were observed in controllable stressful situations. Future research is needed to establish whether the theoretical model also applies to uncontrollable acute stress situations.

The findings of the present dissertation have some specific theoretical implications for the debate on coping effectiveness and determinants of the coping process. In addition, a new theoretical concept was introduced, namely metacognitive awareness about stress and coping. The findings reported in Chapter 5 contribute specifically to hardiness theory and research. Finally, the findings in Chapter 6 contribute to the coping style development literature. These theoretical implications and directions for future research will be discussed in the next sections.

Coping effectiveness

The findings contribute to the debate about the effectiveness of coping behavior which has been central to coping research for a long time (see reviews by Aldwin, 2007; Folkman & Moskowitz, 2004; Zeidner & Saklofske, 1996). In general, task-focused coping is assumed to be most effective in controllable task situations, which are the focus of the present dissertation. There has been some debate about the (in)effectiveness of emotion-focused coping in controllable situations. Emotion-focused coping strategies are assumed to be ineffective in controllable stressful situations, because they distract people from task-focused coping strategies. However, Lazarus and Folkman (1984) have stated that some forms of emotion-focused coping may facilitate task-focused coping and therefore can be effective in controllable stress situations. For example, Carver and Scheier (1994) found that positive reframing (i.e., a form of emotion-focused coping) in the stage after a stressful encounter leads to positive challenge emotions.

The findings in this dissertation showed that emotion-focused coping behavior was not effective in an acute stress situation. This was in line with our expectations, as we assumed that the nature of an acute stress situation (sudden, intense and requiring an immediate response) leaves little time for emotion-focused coping to be effective, because every second counts and

immediate solutions are requested. In other words, the potential benefits of emotion-focused coping strategies (i.e., focusing attention on emotion and physiological reactions to control them) do not apply to acute stress situations, because it distracts people from upcoming danger. These results do not necessarily disagree with the notion that some forms of emotion-focused coping can be effective during a controllable stressful situation. First, no specific emotion-focused coping strategies were measured and therefore no inferences can be made about the effectiveness of a specific emotion-focused coping strategy, such as positive reframing (i.e., trying to see the positive side of a stressful situation) because we used a coping style scale (CISS, Endler & Parker, 1990; 1994) that measured more generic dimensions of coping (i.e., task-focused, emotion-focused and avoidance-orientated coping style). Second, emotion-focused coping strategies might be effective in the stages before and after a controllable acute stress situation. Consider, for example, infantry-soldiers who have to recuperate after they have found cover from an initial attack. Or a surgeon who has a 2-minute rest before multiple injuries come in. In these moments before and after a controllable acute stress situation, the ability to lower distress can be effective because it prepares professionals for future performance. This would be in line with Folkman and Lazarus (1985) who showed that coping strategies can change in response to the changing demands of a stressful situation. In the studies reported in the present dissertation, coping was not measured during different stages of an acute stress situation. Future studies should focus on the role of specific emotion-focused coping strategies such as positive reframing for performance under acute stress, and study the effectiveness of coping strategies in different stages of an acute stress situation.

Finally, in the studies reported in this dissertation avoidance-oriented coping behavior and avoidance-oriented coping style were also measured. However, avoidance-oriented coping behavior was not included in Chapters 2 and 3, because the internal reliability was insufficient. The most likely explanation for this is that during these military exercises, participants simply did not have the opportunity to show avoidance-oriented coping behavior. Participants could not disengage from the exercises, because they were obliged to participate. The only way to disengage was to quit the training program. Although the internal reliability of avoidance-oriented coping style scale was sufficient, it did not affect appraisal and coping behavior (i.e., task and emotion-focused) above and beyond task- and emotion-focused coping style. This scale appears not to be suitable for the current situation, because it involves items such as ‘visit a friend’, ‘see a

movie' and 'take time off and get away from the situation'. Again, within basic military training, cadets and recruits simply cannot employ most of these coping strategies, because their freedom is constrained. This can also explain the lack of results of avoidance-oriented coping style as predictor of the coping process in a military exercise. Therefore, future research into coping within the military domain can benefit from a coping scale that is specifically developed for the military.

Determinants of the coping process

The findings of the present dissertation also contribute to the debate on whether stable characteristics of the individual affect the coping process in a specific situation. Some scholars (e.g., Folkman & Lazarus, 1985; Cohen & Lazarus, 1973) have argued that the coping process is too dynamic to be predicted by stable person characteristics. These researchers underline that because coping is a process that changes between and within situations, it would be more fruitful to study situational determinants of coping instead of relatively stable person characteristics, such as coping style. Other scholars (Carver & Scheier, 1994; Endler & Parker, 1994) have argued that although coping should be considered to be a process, this does not rule out that people's behavioral habits and beliefs affect coping in a range of different situations. Aldwin (2007) notes that the choice between measuring coping as a process or measuring habitual coping should depend on the research question. In the present dissertation, the aim was to relate stable person characteristics to situational responses, and therefore we measured both coping style and coping behavior. The results in the present dissertation confirm the notion that stable person characteristics do affect the coping process (Carver & Scheier, 1994; Endler & Parker, 1994). The results clearly showed that the person characteristics coping style and coping self-efficacy predict appraisal and coping behavior in an acute stress situation.

As expected, the way people habitually cope with stress (i.e., coping style) affects the way they cope in an acute stress situation. This is in line with other studies that have related coping style to coping behavior during laboratory tasks (Matthews & Campbell, 1998), or before an exam (Carver & Scheier, 1994; Endler & Parker, 1994). In addition, it was shown that people's perceived capability to cope with stress (i.e., coping self-efficacy) determines how they appraise a stressful situation and therefore what kind of coping behavior they show. This is in line with Lazarus and Folkman's (1984) expectation that perceived controllability of a situation determines appraisal and subsequently coping behavior.

Metacognitive awareness about stress and coping

In this dissertation, the concept of metacognitive awareness about stress and coping (MASC) was introduced, which encompasses *insight in one's emotional and physiological reactions and coping behaviors during stressful situations, and the conscious regulation of these reactions and behaviors*. MASC was hypothesized to affect the coping process in two ways. First, metacognitive awareness was expected to be positively related to effective coping behavior in an acute stress situation, because it enables people to effectively modify coping behavior in order to meet the demands of the current situation (i.e., coping flexibility). Second, metacognitive awareness was expected to affect the development of coping style, because it enhances learning from experiences with stressful situations. In other words, people who have a strong metacognitive awareness were expected to develop an effective coping style, because they are able to learn more about the effectiveness of different coping strategies from their experiences during stressful situations (either during training or at work). Finally, metacognitive awareness was expected to be affected by personality and organization characteristics that are known to enhance individual and organizational learning.

The results of Chapter 3 showed that the first expectation was not confirmed. Although metacognitive awareness was positively correlated with task-focused coping behavior, it did not predict coping behavior above and beyond coping style and coping self-efficacy. The results of Chapter 6 did confirm the second expectation on the development of coping style. The findings indicate that people who reflect on their responses during a stressful situation and try to regulate future coping behavior, develop more effective coping styles, probably because they have more insight in what kind of coping is effective (for them) and are able to adapt their coping style when necessary. Finally, the results of Chapter 6 confirm that metacognitive awareness is positively related to dispositional learning goal orientation and perceived error management culture. These findings indicate that MASC has a similar role as metacognitive awareness in the educational domain; it represents a deep-processing strategy towards learning. Thus, metacognitive awareness is a relevant factor for the stress and coping research domain. However, conclusions on the basis of these data should be drawn with caution. These studies are the first to assess the relevance of metacognitive awareness about stress and coping. Future research should aim to reproduce these findings for different populations and settings.

Hardiness

The findings in Chapter 5 specifically contribute to hardiness theory. This study addressed the call for more longitudinal research investigating the mediating processes through which hardiness affects performance and health under stress (Funk, 1992). The results indicate that hardiness affects appraisal and coping behavior through coping self-efficacy and coping style. This is in line with the notion that hardy people tend to engage stressful situation more actively and tend to believe they have personal control over the events they experience and therefore appraise situations as less stressful and show more effective coping responses (Kobasa, 1979). In addition, the study confirmed that Vallerand's (2000) distinction between global, contextual and situational variables is relevant for hardiness research. The findings in Chapter 5 showed that by including contextual and domain-specific person characteristics, the predictive power of hardiness on situational behavior can be improved. Future studies should aim to extend these findings by investigating the mediating role of domain-specific person characteristics between hardiness and health-related outcomes. For example, hardiness scholars suggest that hardiness affects health, because hardy people have health-enhancing attitudes and behaviors (e.g. Maddi & Kobasa, 1984). Studying this assumption implies studying the role of contextual person characteristics, such as health related self-efficacy (Bandura, 1997).

Coping style development

The findings in Chapter 6 extend the literature on coping style development from the domain of developmental psychology to I-O psychology. Coping style development in children and adolescents has been shown to be affected by individual psychological characteristics and the social environment (Skinner & Zimmer-Gembeck, 2007). Likewise, in the conceptual model I hypothesized that personality and organization characteristics influence the development of effective coping style of professionals. The results showed that learning goal orientation and perceived error culture influence the development of coping style, either directly or through metacognitive awareness. In other words, both individual psychological characteristics and characteristics of the social environment are related to the development of coping style in professionals. Coping style development is an important topic for I-O psychology, because professionals develop their coping style either as a result of explicit stress management training (e.g., for fire-fighters, police, etc.) or as a result of the socialization process in which employees adapt their coping style to meet organizational norms that

prescribe how employees should behave in a stressful situation. Little is known about the antecedents of the development of professionals' coping style. Therefore, future research in organizations should address this issue using longitudinal designs.

Practical implications

As has been described in Chapter 1, the present dissertation is the result of a very practical issue for the military, namely how preparation of servicemen and women can be improved for coping with and performance in an acute stress situation. The findings of the present dissertation have several practical implications for military organizations on how to improve training. At the same time, these implications are also relevant for other organizations that have to prepare their professionals for acute stress situations. The findings are relevant for professionals in the police domain, because violent encounters are part of their job. Moreover, other types of professionals, like fire-fighters, pilots, ambulance personnel, and surgeons are also confronted with acute stress situations, because they are responsible for the lives of others in crisis situations. Also, employees in jobs that are traditionally not associated with acute stress are increasingly confronted with sudden threatening situations in their work. Consider for example, civil servants who are attacked by discontent citizens, shop-owners who are at risk for robbery, and even high-school teachers who are confronted with increasing violence in schools. These professionals have in common that they are responsible for an effective resolution of an acute stress situation in order to prevent people and property from being damaged.

The results indicate that during an acute stress situation, professionals should focus their attention on the source of the stress and the job they have to do (i.e., showing task-focused coping behavior), and refrain from managing their distress (i.e., not showing emotion-focused coping behavior), because any lapses of attention may interfere with detecting upcoming danger in time and dealing with it effectively.

The present findings reveal that organizations can enhance professionals' coping behavior and performance in an acute stress situation by enhancing coping self-efficacy and strengthening an effective coping style (more task-focused and less emotion-focused). The results also showed that fostering metacognitive awareness about stress and coping in professionals is also beneficial because it positively affects the development of an effective coping style. Organizations can use training programs such as Stress Exposure Training (SET) (e.g., Johnston & Cannon-Bower, 1996;

Saunders, Driskell, Johnston, & Salas, 1996) to enhance professionals' coping and performance under acute stress, because these programs aim to enhance effective habitual coping, coping self-efficacy, and metacognitive awareness. SET programs teach trainees to reflect upon their stress reactions and responses, and stimulate them to try to use effective coping strategies during stressful situations. SET entails graduated exposure to stress: trainees are exposed to multiple stressful situations starting with low intensity stress and gradually increasing the intensity of the stressful situations. This way, trainees' coping self-efficacy can be enhanced while they master effective coping strategies. Besides providing specific SET programs for employees, SET methods and protocols can also be integrated in regular training programs to enhance coping under acute stress (Driskell, Salas, Johnston, & Wollert, 2007; Thompson & McCreary, 2006). This could be especially useful for military organizations, because servicemen are constantly in training and many military training programs lack standardized protocols aimed at enhancing effective coping and strengthening coping self-efficacy.

Furthermore, the findings in this dissertation showed how personality and organization characteristics influence coping and performance under acute stress and therefore provide implications for selection and training. Findings in Chapter 5 indicate that hardiness could be used as a selection criterion, because hardy participants had a more effective coping style and a stronger coping self-efficacy than less hardy participants, and therefore coped more effectively and performed better during the stressful exercise. Findings in Chapter 6 give insight into issues of trainability. The results showed that participants with a strong learning goal orientation developed a more effective coping style during training. Thus, selecting people with a strong learning goal orientation is beneficial, because these people are more 'trainable': i.e. they are better able to adopt an effective coping style during training.

In addition, the findings indicate that organizations can stimulate professionals' ability to cope under acute stress, by enhancing a learning or mastery climate. Although we measured dispositional learning goal orientation, literature suggests that a goal orientation climate can influence state goal orientation (Payne et al., 2007). In other words, organizations can influence professional's temporary learning goal orientation by fostering a training climate that focuses on mastery and learning, and not on ability. Along the same lines, the findings in this dissertation indicate that an organization's error culture is an important factor in coping style development. The results imply that an error management culture stimulates the development of an effective coping style, whereas an error aversion

culture does not. Thus, organizations can enhance professionals' coping under acute stress by creating an error management culture.

Finally, although these implications are relevant for professionals in the field, note that the present dissertation is focused on controllable acute stress situations. However, professionals can also be confronted with low-control acute stress situations during their work. Consider for example situations in which servicemen are not allowed to help or rescue civilians from hostile forces due to restrictive Rules of Engagement. In these low control stress situations, other types of coping may be more effective (e.g., Park, et al., 2001). Therefore, training programs should also focus on the effectiveness of different kinds of coping in different situations (i.e., training coping flexibility).

Strengths and limitations

The studies described in this dissertation have several strengths. First, a longitudinal design was used which enabled us to test expectations about the development of coping style. Second, appraisal, coping behavior, and performance were measured during a realistic acute stress situation. The exercises entailed threats by physical harm, uncertainty, and time-pressure, continually requiring different effective responses from the participants. Therefore, the results of the studies can be generalized to situations that professionals can encounter in the field compared to lab studies. Third, the findings were cross-validated, since most of them were observed in three independent samples.

Although the current longitudinal field study has clear advantages, it also has disadvantages. First, the study design was constraint by the possibilities of the field. For example, it was not possible to measure performance in the Marine sample, because the training program did not have an exercise in which individual performance under acute stress could be assessed. In addition, for the officer cadet and infantry recruit sample, it was not possible to measure appraisal and coping behavior at different stages during the exercise, because that would cause too much interference with the exercise. Appraisal and coping behavior were measured after the exercise instead of during it, and at the same moment (i.e., cross-sectionally). Therefore, conclusions about the coping process during an acute stress situation should be made with caution. Second, the studies suffered from lost data, because the basic military training programs have attrition. In the analyses, I only included participants who finished the training. In addition, due to practical problems not all participants were able

to participate in all measurements. Therefore, the data set contained missing values. As a result, for some analyses the sample size was small and therefore could have lacked power to detect hypothesized effects. Finally, although the longitudinal nature of the data allows us to draw more robust inferences from the results compared to cross-sectional studies, the studies in this dissertation only provide correlational data and therefore no causal conclusions can be drawn.

Another limitation can be found in the psychometric properties of scales measuring coping. The measurement of coping has been a topic of debate since the beginning of coping research (see Aldwin, 2007; Folkman & Moskowitz, 2004). Some coping scales measure a range of specific coping strategies, whereas others measure more generic and broader coping dimensions. The former often have low internal consistency and can be too specific and therefore not appropriate for different kinds of stressful situations, whereas the latter are sometimes not appropriate for specific stressful situations because the wording is too vague (Aldwin, 2007). In the present dissertation, coping style was measured with a more generic coping style scale (CISS, Endler & Parker, 1990). The subscales (task-focused, emotion-focused and avoidance-oriented coping) had adequate internal reliability. However, contrary the expectations, avoidance-oriented coping style showed only weak correlations with other relevant constructs. It seemed that some items were not appropriate for military training. Moreover, the avoidance coping behavior scale was not included in the analysis because it had insufficient internal consistency and could not be related to avoidance-orientated coping style. Thus, the present study suffered from some psychometric problems associated with coping measurement, making it difficult to draw conclusions about the role of avoidance oriented coping in performance under acute stress.

In Chapter 6, error culture was assessed and analyzed at the individual level (i.e., perceived) and not at the organizational level. In other words, the effect of the variance between individuals in perceived error culture within the organization was assessed. The results tell us something about the way an individual's perception of the organization affects metacognitive awareness and coping style. To assess the influence of error culture across organizations, samples within multiple organizations should be investigated. Therefore, the results of these analyses should be interpreted with caution.

Although the findings confirmed some important expectations posed in the conceptual model, it was not possible to test all expectations, because not all possible relevant personality and organization characteristics were

measured. In addition, some expectations could not be assessed with the current data-set. For example, testing the affect of goal orientation and hardiness on the development of coping self-efficacy was not possible, because coping self-efficacy was not measured at the beginning of military training (it was assumed that at this stage participants were not able to make an adequate assessment of their competence to cope with a stressful military exercise). Finally, the dataset allows for more expectations to be tested, than have been reported in this dissertation. Additional analyses can and will be conducted in the years to come.

To conclude

One of the servicemen we interviewed about the ambush incident said that you never really know how you are going to respond in an acute stress situation, until you have been in one. This is an important reason why servicemen sometimes want to experience an acute stress situation, such as an ambush. They want to see 'what they are made of'. I have heard this often when servicemen and women asked me what my research is about. Although I acknowledge that it is impossible to simulate a life-threatening situation in training, I believe this does not mean the findings in this dissertation are not relevant. The aim of this dissertation was to enhance insight in the processes that explain how people (re)act in acute stress situations. And although the results were obtained in a less threatening situation than a life-threatening situation, I believe the differences in processes are quantitative and not qualitative. In other words, in real life-threatening situations, emotional and physiological reactions are more intense and therefore can be more disabling compared to training situations. In both real life-threatening situations and the stressful exercises studied in this dissertation, it is the coping response that makes the differences. Some evidence for this can be found in one of the interviews:

'At one point … I just felt like my body weighed 200 kilograms … I was afraid to do anything and was not able to do anything. It was so hard… such a fear takes over your control....[...]...I had to pull myself together. [I thought about] ...what I always told my girlfriend: "I will fight my way out and come back alive to the Netherlands". And at that moment it gave me the strength to go on and fight.'

This quote illustrates that this soldier's coping response, defined as cognitive (which is referred to in this quote) and behavioral efforts to control a stressful situation made all the difference. To make a long story short, the present dissertation confirms the importance of coping for

professionals' performance in acute stress situations. In addition, the findings revealed how both person and organization characteristics affect the individual's coping response under acute stress. The findings contribute to a better understanding of the processes that determine people's coping response under acute stress. They provide arguments for further research and more effective training programs for servicemen and other professionals who have to deal with acute stress.

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Nederlandse samenvatting

Summary in Dutch

In augustus 2004 werd de Nederlandse missie in Irak (SFIR-4) geconfronteerd met een gewelddadige hinderlaag, waarbij één militair het leven liet. Het incident, beschreven in Hoofdstuk 1, illustreert het onderwerp van dit proefschrift, namelijk functioneren tijdens een acute stress situatie. Een acute stress situatie kan worden gedefinieerd als een plotselinge, onbekende, intense en kortdurende situatie, die het halen van doelen verstoort en waarop snel en adequaat gereageerd moet worden (Salas, Driskel, & Hughes, 1996). Het doel van dit proefschrift is inzicht te krijgen in de processen die bepalen hoe mensen functioneren in een acute stressvolle situatie. Specifiek is onderzocht hoe persoonskenmerken en kenmerken van de organisatie bijdragen aan het presteren van professionals tijdens dergelijke situaties. Om het functioneren tijdens een acute stress situatie te onderzoeken is gebruik gemaakt van bestaande militaire trainingen. Drie basis militaire opleidingen waren bereid mee te werken aan dit onderzoek: de Nederlandse Defensie Academie, de Lucht Mobiele Brigade en het Korps Mariniers. Bij alle drie zijn twee lichtingen leerlingen onderzocht.

Het onderzoek in dit proefschrift is erop gericht verwachtingen te toetsen voortkomend uit een conceptueel model (zie Hoofdstuk 2) waarin beschreven wordt hoe individuele persoonskenmerken en kenmerken van de organisatie het functioneren van professionals in een acute stress situatie beïnvloeden. Het model is gebaseerd op psychologische theorieën over stress die hieronder worden toegelicht. Stress wordt gedefinieerd als ‘een toestand waarin iemand niet in staat is of zich niet in staat acht aan de door de omgeving gestelde eisen te voldoen’ (Gaillard, 2003, p. 127). Of mensen stress ervaren is dus zowel afhankelijk van de situatie (eisen van de omgeving) als van de kenmerken van de persoon (capaciteiten). Eén van de belangrijkste uitgangspunten in de psychologie over stress is dat mensen kunnen verschillen in de mate van stress die ze ervaren omdat ze situaties verschillend taxeren. Volgens Lazarus en Folkman (1984) stellen mensen zichzelf (onbewust) twee vragen als ze in een potentieel dreigende situatie terechtkomen. De eerste vraag is ‘Hoe bedreigend is de situatie?’ en de tweede vraag is ‘Wat kan ik er aan doen?’. Afhankelijk van de beantwoording van deze twee vragen ervaart iemand de situatie als stressvol

of niet. Over het algemeen wordt een situatie als stressvol ervaren als iemand het idee heeft dat hij of zij weinig kan doen om de bedreigende situatie te beïnvloeden. Als iemand denkt dat de situatie gecontroleerd kan worden, zal minder stress worden ervaren. Als mensen een situatie als stressvol ervaren, kan dit verschillende reacties oproepen (emotioneel, lichamelijk en cognitief). Emotionele stressreacties zijn angst en boosheid. Lichamelijke stressreacties zijn een hoge bloeddruk en hartslag, trillen, zweten en vermoeidheid. Cognitieve stressreacties bestaan uit niet kunnen nadenken, gedachten niet kunnen afmaken, niet realistische gedachten hebben of tunnelvisie. Taakuitvoering en besluitvorming kunnen verminderen door stressreacties, omdat ze mensen afleiden van wat ze moeten doen (Gaillard, 2008). Of dit daadwerkelijk gebeurt, hangt af van de manier waarop mensen omgaan met de situatie, oftewel coping (Lazarus & Folkman, 1984). Er wordt een onderscheid gemaakt tussen copingstrategieën die gericht zijn op het aanpakken van de bron van de stress (taakgerichte coping), het verminderen van de emotionele en lichamelijke stressreacties (emotiegerichte coping) en het ontwijken van de situatie (ontwijkende coping) (Endler & Parker, 1990). Over het algemeen is in controleerbare situaties taakgerichte coping het meest effectief. Kortom, in situaties waar mensen daadwerkelijk de bron van de stress kunnen aanpakken (bijvoorbeeld, gaan studeren voor een examen) is het effectief dat zij zich richten op de uitvoering van de taak en niet op hun emotionele en lichamelijke reacties. In oncontroleerbare situaties (bijvoorbeeld, wachten op de uitslag van een examen) kan emotiegerichte coping of ontwijkende coping wel effectief zijn. Dit proefschrift gaat over het functioneren in controleerbare acute stress situaties, waarin wordt verondersteld dat taakgerichte coping effectiever is dan emotiegerichte en ontwijkende coping.

In het conceptuele model wordt verondersteld dat iemands copingreactie tijdens een acute stress situatie mede wordt bepaald door de persoonskenmerken *copingstijl*, *coping eigeneffectiviteit* en *metacognitief bewustzijn*. Omdat van deze persoonskenmerken wordt verondersteld dat zij te ontwikkelen zijn, zijn zij interessant voor organisaties die hun werknemers willen trainen voor het omgaan met acute stressvolle situaties. Copingstijl verwijst naar habituele coping: mensen hebben vaak een voorkeur om een bepaalde vorm van coping te gebruiken in stressvolle situaties (Carver & Scheier, 1994). Coping eigeneffectiviteit verwijst naar het vertrouwen dat mensen hebben in hun eigen capaciteiten om te functioneren in stressvolle situaties (Bandura, 1997), en in dit onderzoek specifiek naar het vertrouwen dat leerlingen van militaire basisopleidingen

hebben in hun capaciteiten om te functioneren onder stressvolle omstandigheden. Tot slot verwijst metacognitief bewustzijn naar de mate van inzicht in eigen stressreacties en copinggedrag tijdens een stressvolle situatie en de bewuste regulatie van toekomstig copinggedrag om beter te kunnen functioneren onder stress. Omdat ik onder andere geïnteresseerd waren in de ontwikkeling van deze persoonskenmerken tijdens militaire basistraining, werden ze op verschillende momenten tijdens de basis militaire opleidingen gemeten. Copingstijl werd gemeten aan het begin, in het midden en aan het einde van de opleiding. Coping eigeneffectiviteit en metacognitief bewustzijn werden gemeten in het midden en aan het einde van de opleiding, maar niet aan het begin omdat werd verondersteld dat de leerlingen dan nog geen adequate inschatting konden maken omdat ze dan nog geen stressvolle oefeningen meegemaakt hadden.

Vervolgens wordt in het conceptuele model verondersteld dat persoonlijkheids- en organisatiekenmerken de reacties van professionals tijdens een acute stress situatie beïnvloeden, omdat ze (de ontwikkeling van) copingstijl, coping eigeneffectiviteit en metacognitief bewustzijn beïnvloeden. Persoonlijkheidskenmerken zijn stabiele psychologische kenmerken van een individu. In dit proefschrift zijn twee persoonlijkheidskenmerken onderzocht: *doeloriëntatie* en *gehardheid*. Belangrijke organisatiekenmerken zijn de organisatiecultuur, maar ook de training en de steun die de organisatie professionals biedt in het omgaan met stressvolle situaties. In dit proefschrift werd *waargenomen foutencultuur* onderzocht als organisatiekenmerk. Persoonlijkheid werd gemeten in de eerste week van de opleiding. Waargenomen foutencultuur werd gemeten in het midden van de opleiding, omdat verwacht werd dat leerlingen aan het begin van de opleiding nog geen adequate inschatting kunnen maken van de foutencultuur.

In Hoofdstuk 3 werd onderzocht of de persoonskenmerken copingstijl, coping eigeneffectiviteit en metacognitief bewustzijn daadwerkelijk taxatie, copinggedrag en prestatie tijdens een acute stressvolle situatie beïnvloeden. Hiervoor werden copinggedrag en prestatie onderzocht tijdens een stressvolle militaire oefening. Het betrof een zelfverdedigingsoefening waarin leerlingen een parcours moesten lopen en onderweg ‘tegenstanders’ konden tegenkomen die ze aanvielen. De leerlingen moesten zich verdedigen met aangeleerde zelfverdedigingstechnieken. Ze kwamen onderweg ook ‘tegenstanders’ tegen die alleen verbaal geweld gebruikten. De leerlingen moesten laten zien dat ze in staat waren proportioneel geweld te gebruiken (niet meer geweld dan nodig is). De leerlingen werden beoordeeld door militaire

instructeurs. De resultaten in dit hoofdstuk bevestigden dat taakgerichte coping effectief was en emotiegerichte coping niet. Daarnaast lieten de resultaten zien dat copingstijl en coping eigeneffectiviteit gerelateerd waren aan effectieve coping. Leerlingen met een meer taakgerichte copingstijl, lieten ook meer taakgerichte coping zien tijdens de oefening en presteerden daardoor beter. Leerlingen met een meer emotiegerichte copingstijl lieten daarentegen meer emotiegerichte copinggedrag zien tijdens de oefening en presteerden daardoor slechter. Daarnaast vertoonden leerlingen met meer vertrouwen in hun capaciteiten om te functioneren in stressvolle situaties meer taakgerichte copinggedrag. Metacognitief bewustzijn bleek niet het verwachte effect op copinggedrag te hebben. In Hoofdstuk 4 wordt aangetoond dat coping eigeneffectiviteit copinggedrag beïnvloedt omdat het de taxatie van de situatie beïnvloedt. Uit de resultaten bleek dat leerlingen met een sterke coping eigeneffectiviteit de oefening als minder stressvol taxeerden en daarom meer taakgerichte en minder emotiegerichte coping gebruikten. Daarmee komt uit de hoofdstukken 3 en 4 naar voren dat iemands habituele coping (copingstijl) en vertrouwen in eigen capaciteiten om met stressvolle situaties om te gaan (coping eigeneffectiviteit) belangrijke voorspellers zijn voor het functioneren in een acute stress situatie.

In hoofdstuk 5 werd vervolgens onderzocht of copingstijl en coping eigeneffectiviteit worden beïnvloed door gehardheid. Gehardheid wordt verondersteld de negatieve effecten van stress op prestatie en gezondheid te verminderen, omdat geharde mensen bedreigende situaties als minder stressvol ervaren en coping strategieën gebruiken die effectiever zijn. Dit komt omdat geharde mensen het idee hebben dat ze controle hebben over de situatie, ze gecommitteerd zijn aan de dingen die ze doen, en ze veranderingen als een uitdaging zien en niet als een bedreiging (Kobasa, 1979; Maddi & Kobasa, 1984). Hierdoor hebben geharde mensen over het algemeen meer vertrouwen in hun capaciteiten om situaties te beïnvloeden en hebben ze een actieve probleemoplossende houding ten opzichte van stressvolle situaties. Daarom werd verwacht dat eigeneffectiviteit en copingstijl een mediërende rol hebben tussen gehardheid en het functioneren tijdens een acute stressvolle situatie. De resultaten bevestigden deze verwachtingen. Geharde leerlingen hadden een sterkere coping eigeneffectiviteit en taxeerden de oefening daarom als minder stressvol. Daarnaast hadden geharde leerlingen een meer taakgerichte en minder emotiegerichte copingstijl, en vertoonden daarom ook meer taakgerichte coping en minder emotiegerichte coping tijdens de oefening.

In hoofdstuk 4 en 6 van dit proefschrift werd tenslotte onderzocht in hoeverre de leerlingen zich tijdens militaire opleiding ontwikkelden op het gebied van coping eigeneffectiviteit en copingstijl en welke factoren deze ontwikkeling beïnvloeden. Uit analyses bleek dat de leerlingen tijdens de militaire opleidingen over het algemeen een copingstijl ontwikkelden die meer taakgericht en minder emotiegericht was, en dat hun vertrouwen in hun eigen capaciteiten om te functioneren tijdens stressvolle oefeningen toenam. De leerlingen lieten geen gemiddelde toename of afname zien in ontwijkende coping stijl.

In hoofdstuk 6 werd vervolgens onderzocht of de ontwikkeling van copingstijl werd voorspeld door metacognitief bewustzijn, doeloriëntatie en waargenomen foutencultuur. De verwachting was dat leerlingen die meer inzicht hebben in hun eigen stressreacties en copinggedrag en bewust toekomstig copinggedrag proberen te reguleren, meer zouden leren over effectief copinggedrag tijdens stressvolle oefeningen en daarom een copingstijl zouden ontwikkelen die meer taakgericht was en minder emotiegericht en ontwijkend. De resultaten van een analyse waarbij het effect van metacognitief bewustzijn op copingstijl aan het eind van de opleiding gecontroleerd werd voor copingstijl aan het begin van de opleiding, bevestigden deze verwachting. Leerlingen die meer metacognitief bewust waren, ontwikkelden een effectievere copingstijl.

Daarnaast werd het effect van doeloriëntatie op de ontwikkeling van copingstijl onderzocht. Doeloriëntatie is een persoonlijkheidskenmerk dat verwijst naar iemands generieke voorkeur voor een bepaald soort doel bij het leveren van prestaties. Er wordt een onderscheid gemaakt tussen een leer-doeloriëntatie gericht op het versterken van de eigen competenties en een prestatie-doeloriëntatie gericht op het krijgen van positieve beoordelingen van anderen (Deci & Ryan, 2000; Ames & Archer, 1988; Dweck, 1986). Mensen die een leer-doeloriëntatie hebben, gebruiken strategieën die gericht zijn op het vergroten van hun inzicht. Mensen die een prestatie-doeloriëntatie hebben, gebruiken strategieën die gericht zijn op het vertonen van goede resultaten en zijn daardoor minder gericht op het vergroten van inzicht (Moneta & Spada, 2009). Daarom was de verwachting dat leer-doeloriëntatie positief en prestatie-doeloriëntatie negatief gerelateerd zouden zijn aan metacognitief bewustzijn en de ontwikkeling van een effectieve copingstijl. Zoals verwacht hadden leerlingen met een sterkere leer-doeloriëntatie een sterker metacognitief bewustzijn en ontwikkelden daardoor een effectievere coping stijl. Prestatie-doeloriëntatie was niet gerelateerd aan metacognitief bewustzijn en aan de ontwikkeling van copingstijl tijdens basis militaire training. Daarmee laten deze resultaten

zien dat naast gehardheid, leer-doeloriëntatie van invloed is op het functioneren van professionals in acute stress situaties omdat het copingstijl beïnvloedt.

Ten slotte werd de invloed van waargenomen foutencultuur onderzocht. Het belang van foutencultuur voor het leren van werknemers is al eerder aangetoond (Cannon & Edmondson, 2001; Van Dyck, 2000). Er wordt een onderscheid gemaakt tussen twee soorten culturen: een cultuur van "foutenmanagement", gericht op het anticiperen op, omgaan met en leren van fouten, en een cultuur van "foutenvermijding", gericht op het vermijden van fouten. De eerste leidt tot communicatie, acceptatie en leren van fouten bij werknemers, de tweede leidt tot angst voor het maken van fouten en het vermijden van situaties waarin fouten kunnen worden gemaakt bij werknemers en draagt daardoor niet bij aan het leren van fouten. Omdat stressvolle situaties, zoals een militaire oefening, vaak gepaard gaan met fouten die de kans op stress weer vergroten, was de verwachting dat de foutencultuur van een organisatie van invloed is op het leren omgaan met stressvolle situaties, en dus van invloed is op metacognitief bewustzijn en daardoor op de ontwikkeling van een effectieve coping stijl. Daarom is in Hoofdstuk 5 de invloed van de foutencultuur onderzocht. Uit de analyses bleek dat een foutenmanagementcultuur inderdaad leidde tot de ontwikkeling van een effectievere copingstijl. Ten eerste omdat leerlingen die de foutencultuur zagen als accepterend en anticiperend ten aanzien van het maken van fouten, een sterker metacognitief bewustzijn hadden en daardoor een effectievere coping stijl. Ten tweede omdat leerlingen die de foutencultuur zagen als stimulerend ten aanzien van het leren van fouten, een meer taakgerichte en minder emotiegerichte copingstijl ontwikkelden. Tenslotte bleek dat een foutenvermijdingscultuur leidde tot de ontwikkeling van een copingstijl die meer emotiegericht en ontwijkend was. Daarmee kan geconcludeerd worden dat waargenomen foutencultuur van belang is voor de ontwikkeling van copingstijl van leerlingen in een militaire training.

De resultaten van het onderzoek laten zien welke mechanismen bijdragen aan effectieve prestatie tijdens een acute stress situatie. Ten eerste blijkt dat het copinggedrag dat mensen laten zien, bepaalt of mensen in staat zijn te presteren ondanks stressreacties: tijdens een controleerbare acute stress situatie presteren mensen die zich richten op hun taak en zich niet laten afleiden door emotionele en fysiologische reacties het beste. Ten tweede laat het onderzoek zien dat de persoonskenmerken copingstijl en coping eigeneffectiviteit invloed hebben op copinggedrag tijdens een acute stress situatie. Door copingstijl en coping eigeneffectiviteit te trainen, kunnen organisaties het functioneren van professionals tijdens acute stress

situaties verbeteren. Ten derde laat het onderzoek zien dat het persoonlijkheidskenmerk gehardheid ook het functioneren tijdens stressvolle situaties beïnvloedt omdat geharde mensen een effectievere copingstijl hebben en een sterkere coping eigeneffectiviteit. Daarnaast bleek dat het persoonlijkheidskenmerk leer-doeloriëntatie in positieve zin bijdroeg aan de ontwikkeling van een effectieve coping stijl, omdat leerlingen met een sterke leer-doeloriëntatie zich meer bewust waren van hun eigen stressreacties en copinggedrag, en bewust probeerden hun copinggedrag te reguleren. Deze bevindingen suggereren dat organisaties gehardheid en leer-doeloriëntatie als selectie-criterium kunnen gebruiken. Tot slot blijkt uit de resultaten dat naast selectie en training, organisatiecultuur ook van invloed kan zijn op het functioneren van professionals in acute stress situaties, omdat het de ontwikkeling van een effectieve copingstijl beïnvloedt. Een organisatie met een foutenmanagementcultuur gericht op het anticiperen op, omgaan met en leren van fouten stimuleert de ontwikkeling van een effectieve copingstijl, terwijl een organisatie met een foutenvermijdingscultuur het tegendeel bereikt.

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Appendix 1

Metacognitive awareness about stress and coping (MASC) scale

Items in Dutch:

Als mensen in een stressvolle situatie zitten, bijvoorbeeld tijdens een militaire oefening, kunnen ze last krijgen van spanningsreacties: bijvoorbeeld boosheid en angst, of een hoge hartslag, kortademigheid en zweten. Mensen gebruiken verschillende manieren om met stressvolle situaties en spanningsreacties om te gaan. Hieronder staan enkele uitspraken over de kennis die jij hebt over je eigen spanningsreacties en manieren die je gebruikt om om te gaan met stressvolle situaties en spanning.

De onderstaande uitspraken gaan over de spanningsreacties die jij ervaart tijdens stressvolle situaties. Geef bij elke uitspraak aan in hoeverre die op jou van toepassing is.

1. Ik weet hoe mijn lichaam reageert in een stressvolle situatie
2. Ik weet hoe ik me zal voelen als ik in een stressvolle situatie zit
3. Ik weet welke emotionele reacties ik heb in een stressvolle situatie
4. Ik weet welke spanningsreacties tijdens stressvolle situaties mijn functioneren belemmeren
5. Ik weet welke lichamelijke reacties zich bij mij voordoen in een stressvolle situatie

De onderstaande uitspraken gaan over de *manieren die jij gebruikt* om met stressvolle situaties en spanningsreacties om te gaan. Geef bij elke uitspraak aan in hoeverre die op jou van toepassing is.

6. Ik weet welke manieren mij helpen om te gaan met stressvolle situaties
7. Ik probeer manieren te kiezen die in het verleden goed hebben gewerkt

8. Ik gebruik automatisch juiste manieren die mij helpen om te gaan met stressvolle situaties
9. Ik heb mezelf nieuwe manieren aangeleerd om met stressvolle situaties om te gaan
10. Ik heb verschillende manieren om met spanningsreacties om te gaan achter de hand als één manier niet werkt
11. Ik pas de manier die ik gebruik om met spanningsreacties om te gaan aan als dat nodig is
12. Ik weet wanneer een manier om met spanning om te gaan voor mij het beste werkt

Geef bij elke uitspraak aan in hoeverre die op jou van toepassing is.

Tijdens een stressvolle oefening…

13. …bedenk ik wat ik kan doen om met de spanning om te gaan
14. …probeer ik me bewust te zijn van mijn lichamelijke reacties
15. …bedenk ik wat ik zou kunnen doen om mijn functioneren te verbeteren
16. …kijk ik kritisch naar mijn eigen prestatie
17. …probeer ik me bewust te zijn van mijn emotionele reacties

Geef bij elke uitspraak aan in hoeverre die op u van toepassing is.
Na een stressvolle oefening bedenk ik…

18. …wat er is gebeurd
19. …hoe ik heb gereageerd
20. ...wat mijn emotionele reacties waren
21. ...wat mijn lichamelijke reacties waren

22. …of ik bewust heb gekozen om op een bepaalde manier met de spanning om te gaan
23. …wat ik heb gedaan om te kunnen blijven functioneren
24. …of ik mijn doel bereikt heb
25. …wat ik de volgende keer beter kan doen
26. …wat ik heb geleerd

Appendix 2

Coping self-efficacy scale for military training

Items in Dutch:

Stel je voor dat je de komende maand een stressvolle of dreigende situatie tegenkomt. Bijvoorbeeld tijdens een oefening. Beantwoord de vragen alsof je de situatie vandaag nog zou tegen komen.
Je kunt antwoorden op een 10- puntsschaal, met 1 ‘helemaal geen’ tot 10 ‘heel veel’ vertrouwen. Zet een kringetje om het cijfer dat voor jou van toepassing is.

Ik heb er vertrouwen in…

1. …dat ik me op mijn taak kan blijven richten, ook al voel ik me angstig
2. …dat ik goede beslissingen kan nemen in stressvolle situaties
3. …dat ik mijn plan voor ogen kan houden, ook al voel ik me bedreigd
4. …dat ik rustig kan blijven in stressvolle omstandigheden
5. …dat ik mijn angst de baas kan blijven onder dreigende omstandigheden
6. …dat ik mijn taak goed kan uitvoeren ook al ben ik gespannen
7. …dat ik samen kan werken in stressvolle situaties
8. …dat ik anderen om hulp kan vragen in stressvolle situaties
9. …dat ik anderen kan steunen in hun taak tijdens dreigende situaties
10. …dat ik mijn drills goed kan toepassen in dreigende situaties
11. …dat ik instructies kan volgen als ik gespannen ben

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